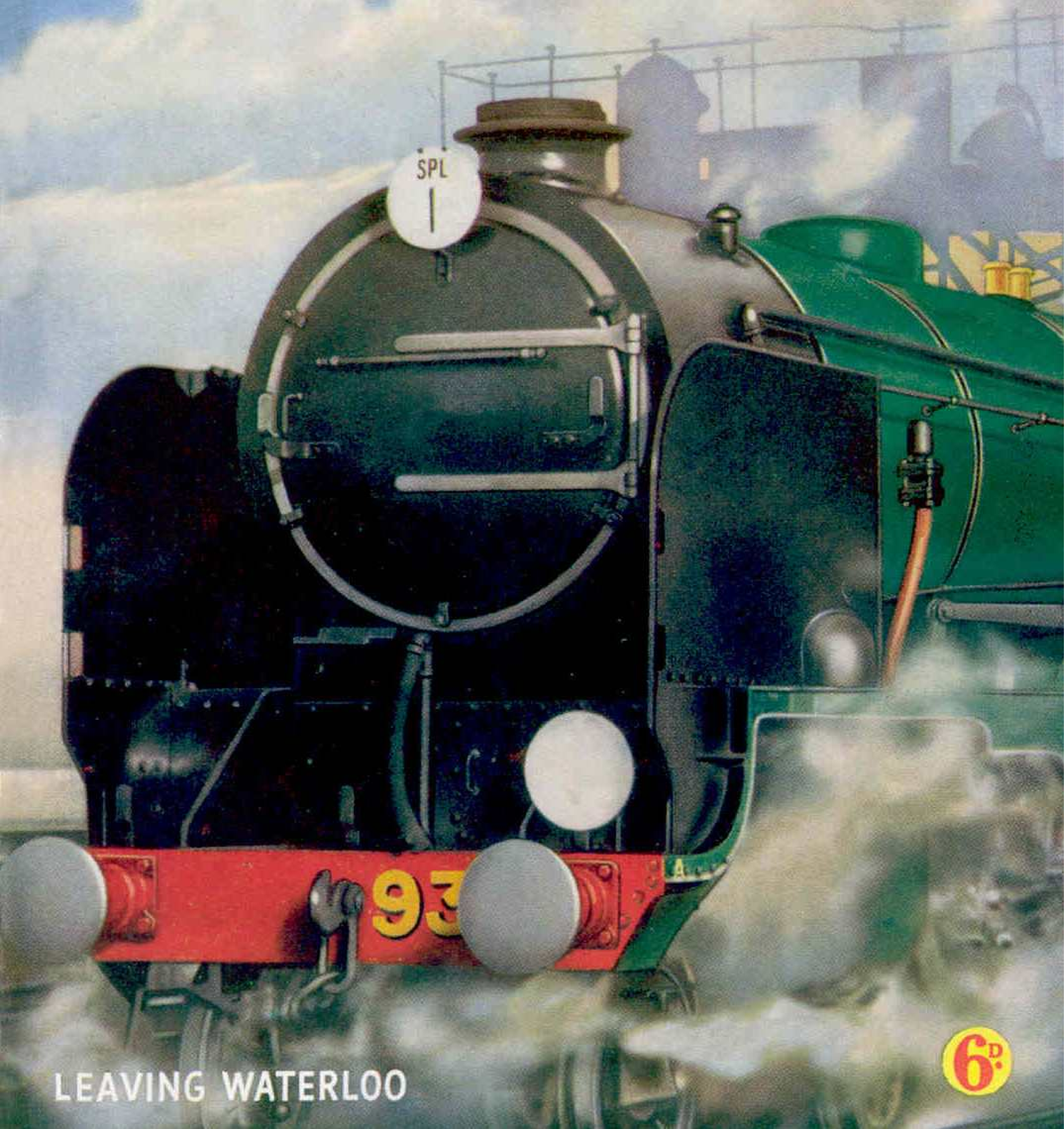


VOL. XXXII. No.3

MARCH 1947

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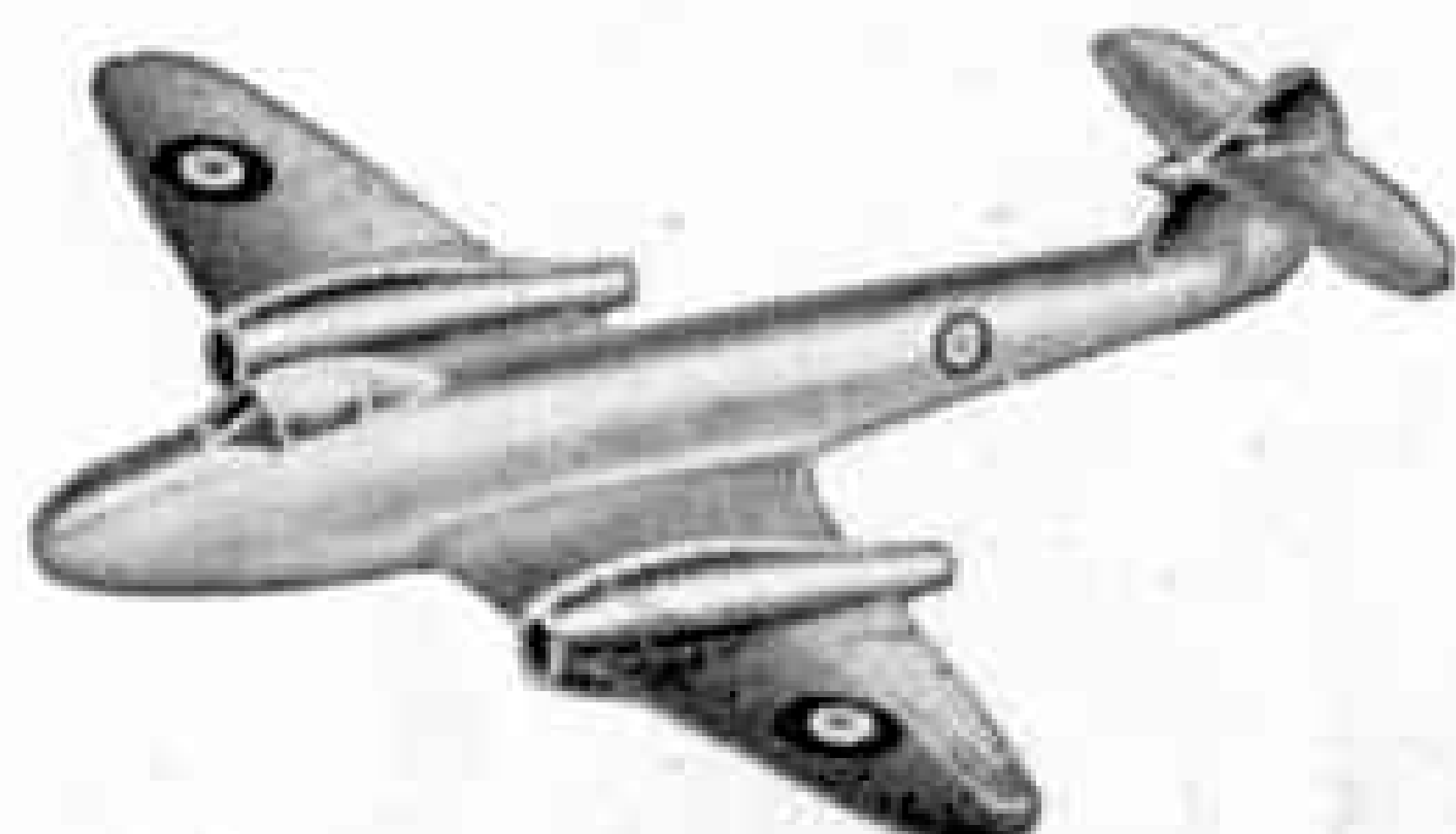
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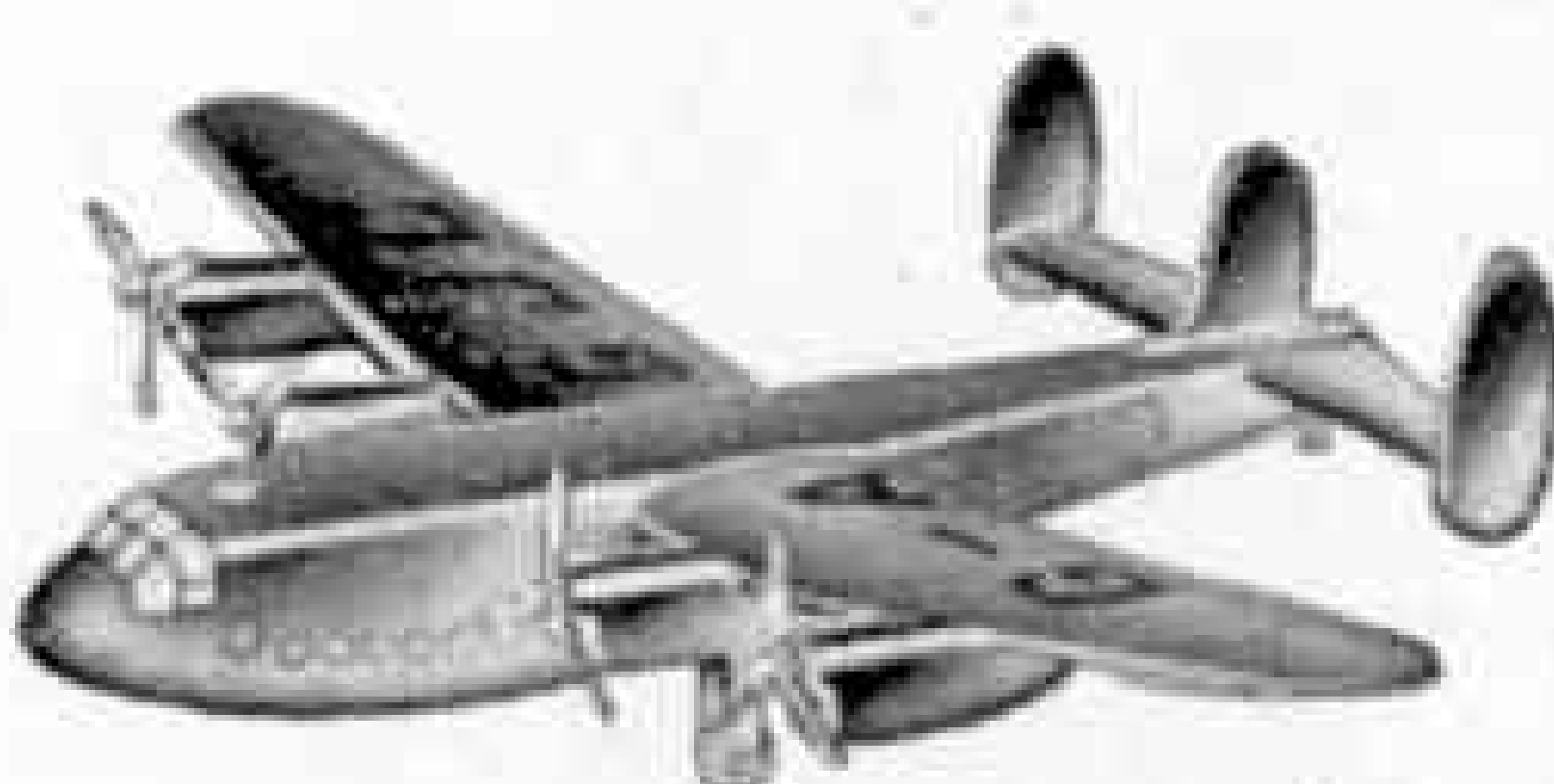
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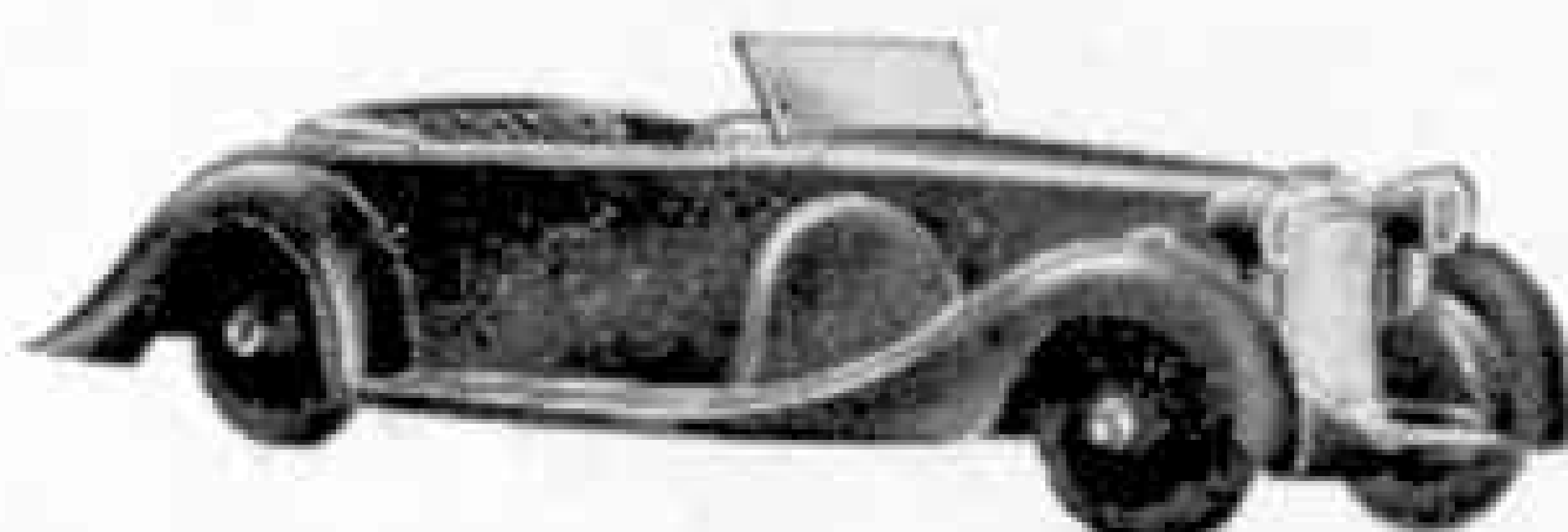
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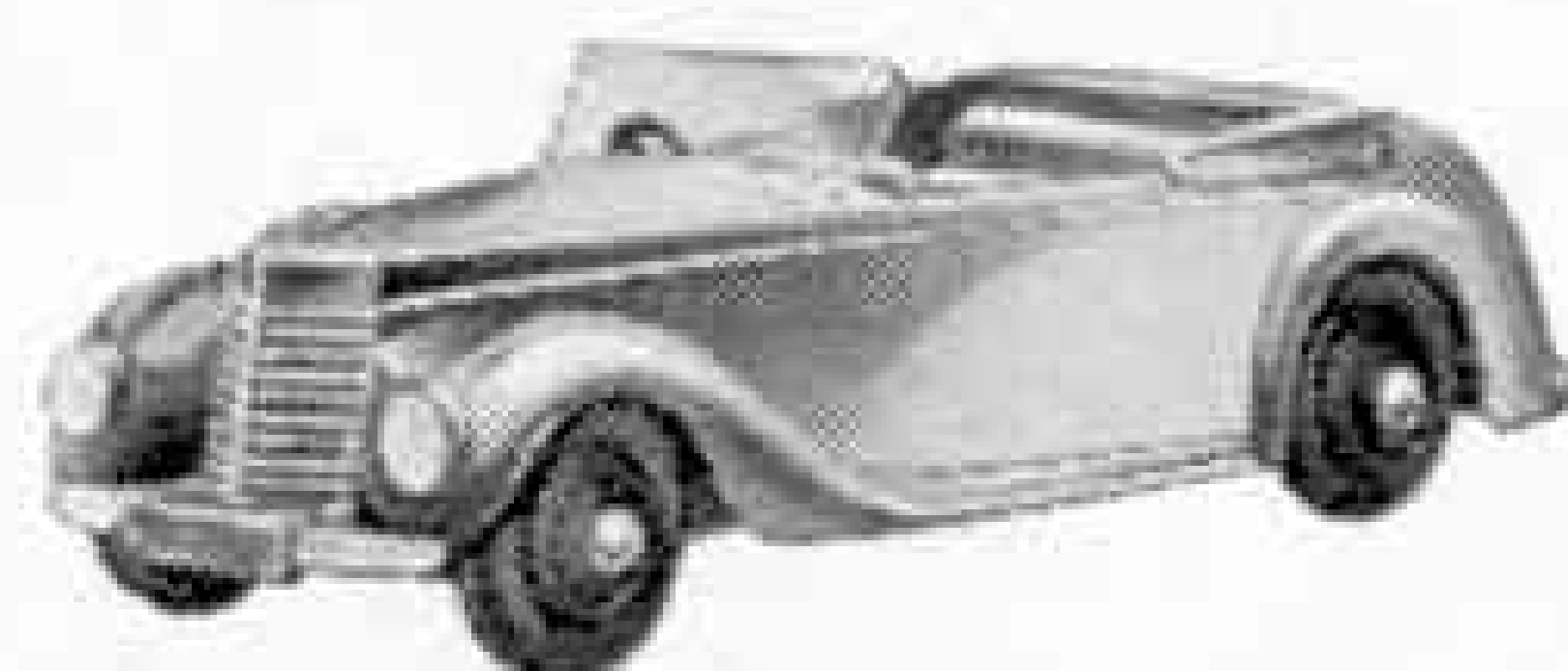
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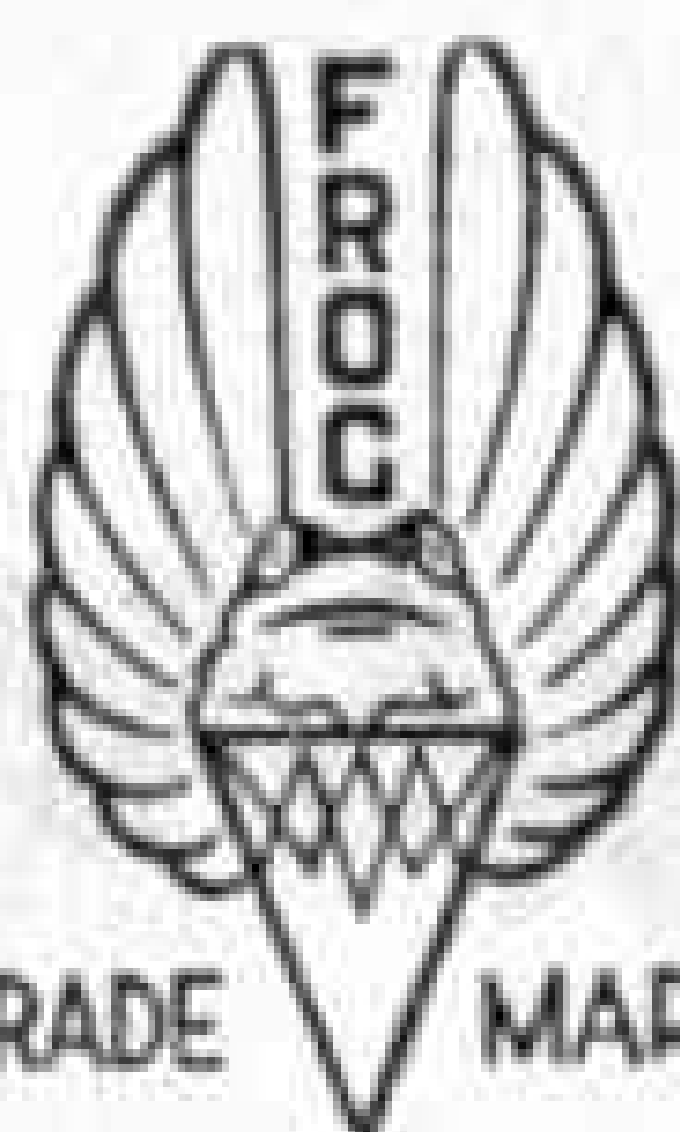


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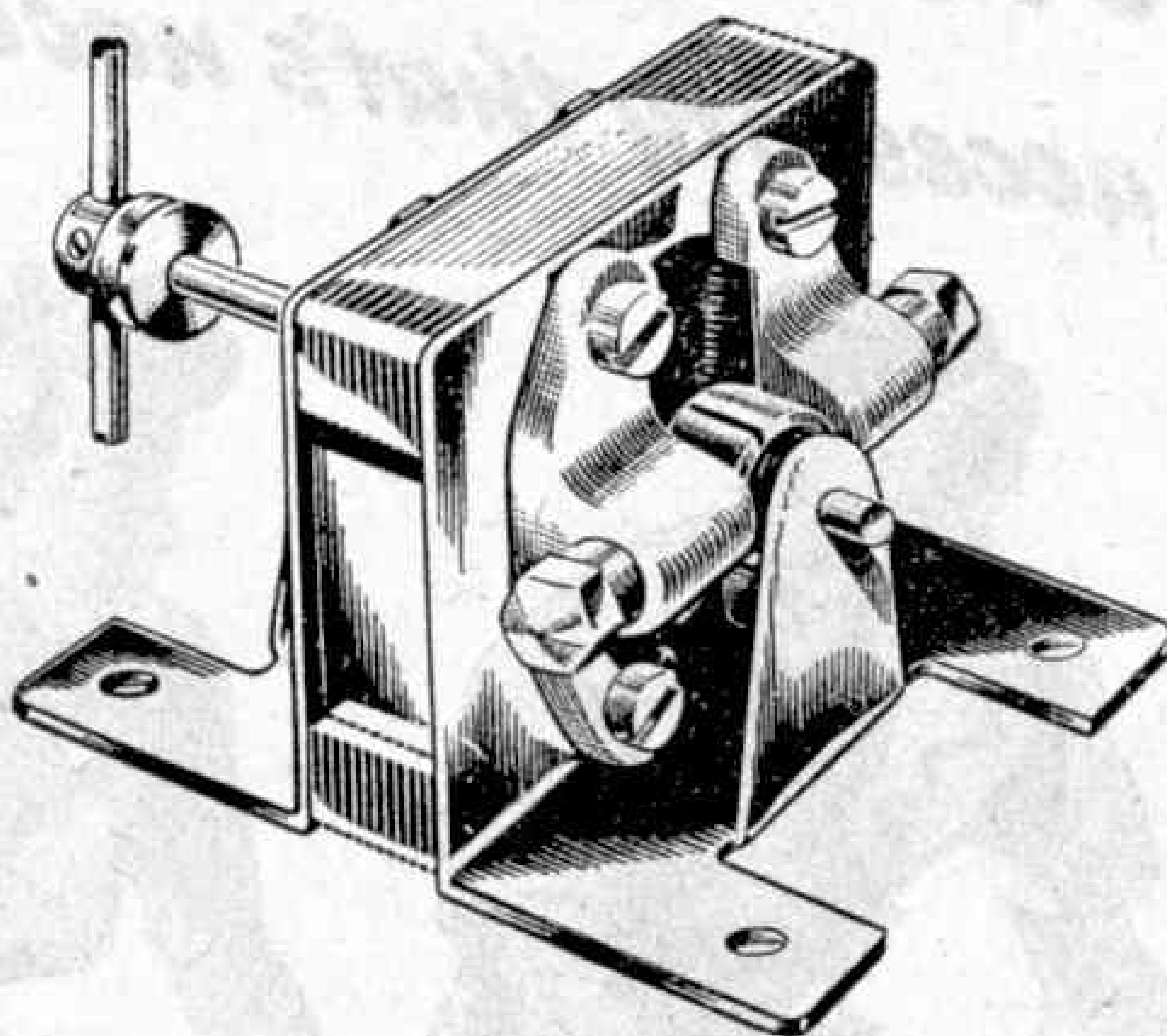
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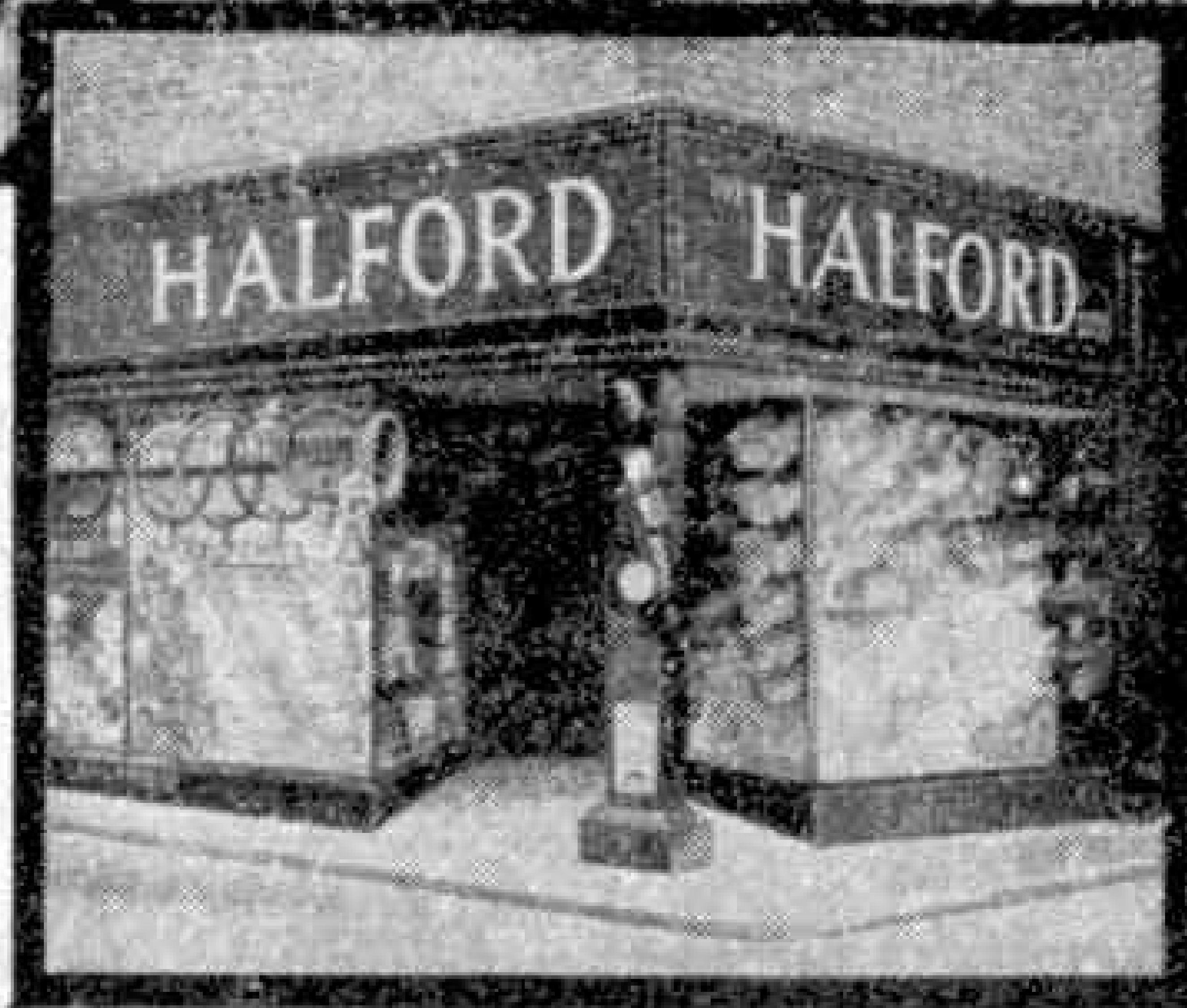
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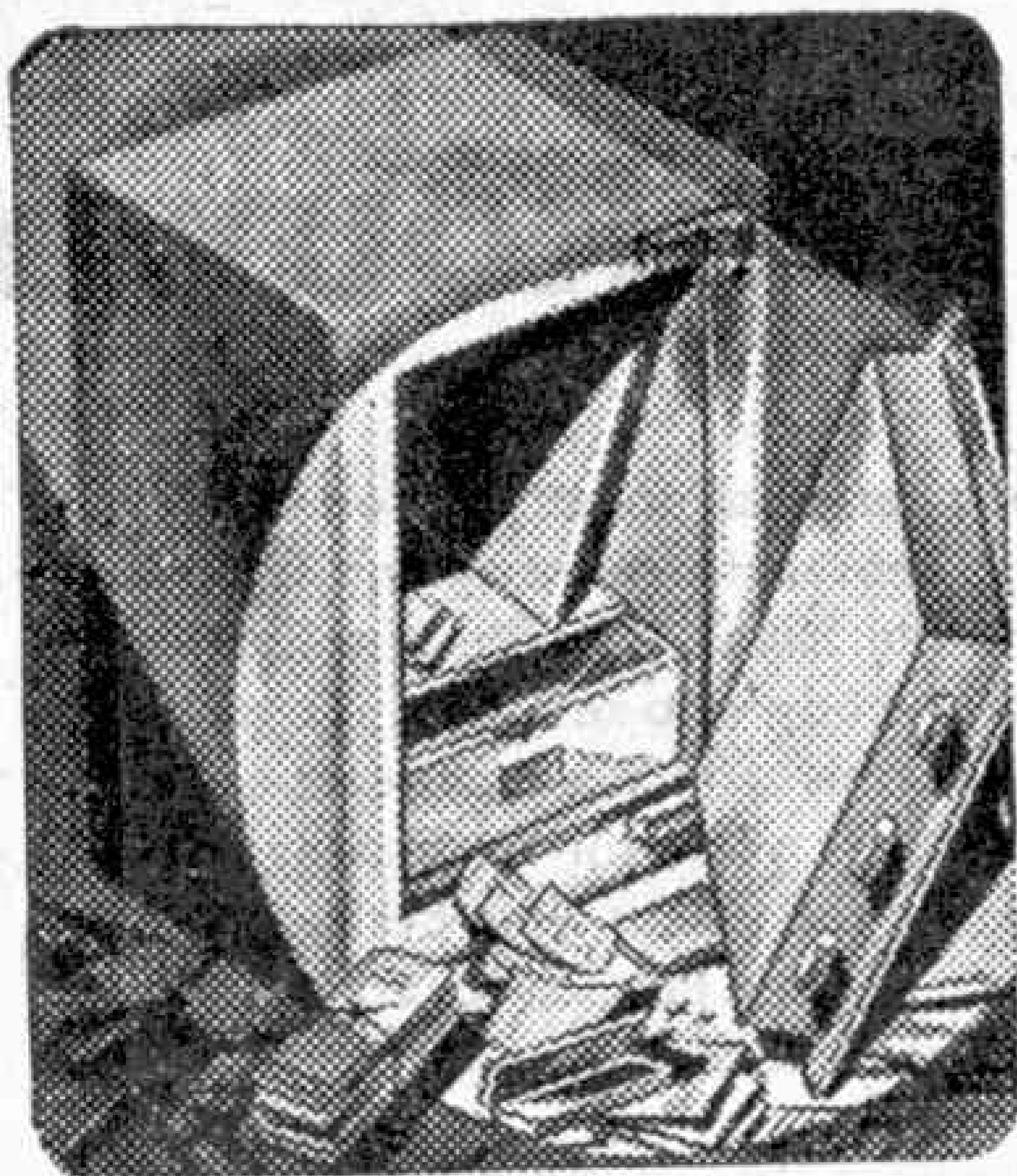
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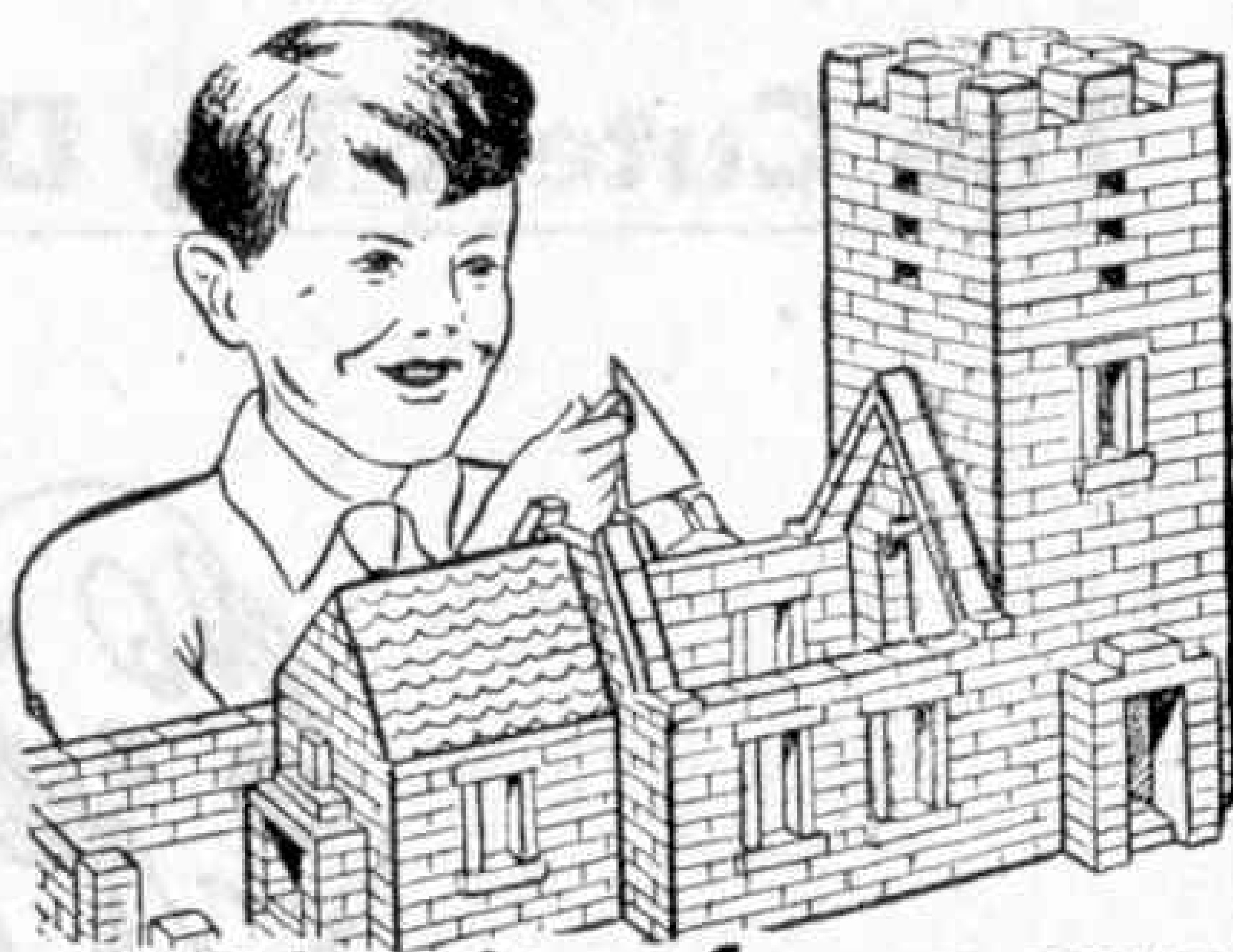
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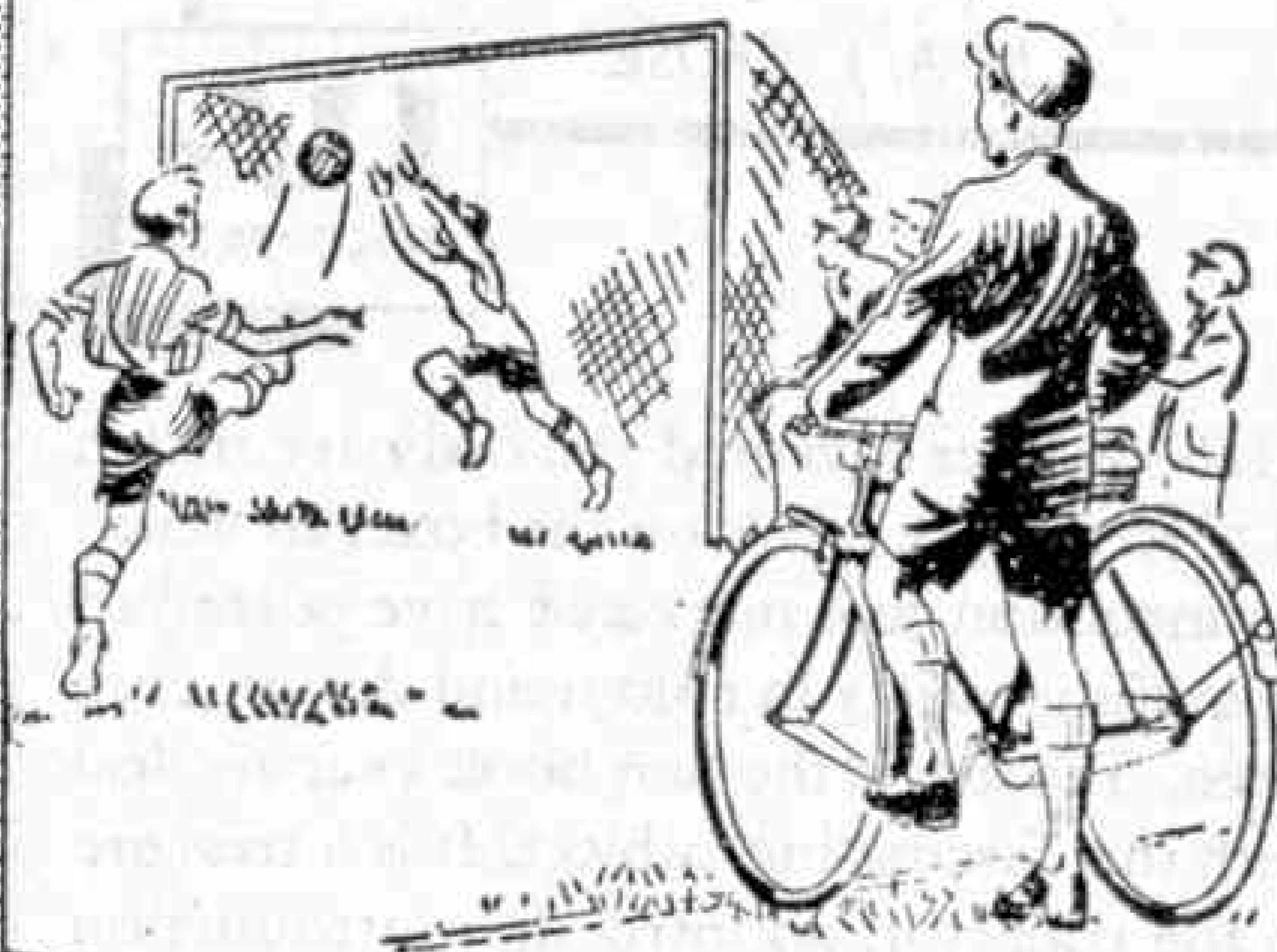
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MAGAZINE

Vol. XXXII
No. 3
March 1947

With the Editor

Bell and the Telephone

On 14th February 1876 was filed in the Patent Office of the United States an application for a patent for an instrument for transmitting electrically the human voice—in other words, a telephone.

This application was made by Alexander Graham Bell, who was born at Edinburgh on 3rd March 1847. Bell studied at the Universities of Edinburgh and London, and adopted the family calling, that of a teacher of elocution, in which capacity his grandfather and his father had been very successful. In 1870 the family removed to Canada, and two years later Bell was appointed Professor of Vocal Physiology in the University of Boston.

Soon afterwards Bell gave up his official post and began giving private lessons. He now had more time for experimental work on a scheme for a musical telegraph to which he had already given much thought. He engaged an assistant, Thomas A. Watson, and the two men worked for three years on Bell's ideas.

One afternoon in June 1875 Bell and Watson were testing a new arrangement of their apparatus. Watson, who was working alone, was having trouble with the spring of his instrument, which, instead of vibrating freely, was continually sticking to the pole of its magnet. To free the spring Watson repeatedly plucked at it. Suddenly Bell, who was working in another room, rushed into Watson's room in a state of great excitement. "What did you do then?" he demanded. "Don't change anything. Let me see!" He had heard in his room a faint reproduction of the twanging of the spring as Watson plucked at it. The vibration of the spring over the pole of its magnet had generated a current and so transmitted the sound.

Bell had sufficient imagination to realise that if this sound could be transmitted, there was no reason why specially designed apparatus should not transmit any other sound, or even speech.

Work on the musical telegraph was immediately put on one side and the two men worked desperately hard for several months to produce a speaking telephone. On 10th March 1876 Bell spoke the first words that ever passed clearly and distinctly over electric wires. The words were simple, but have become historic: "Mr. Watson, please come here, I want you."

By a remarkable coincidence another inventor, Elisha Gray, of Chicago, lodged a patent for a telephone on the very same day as Bell. Enquiry showed that Bell's application was the first, and therefore the patent was awarded to him.

Some of this Month's Articles

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About Air Inventions

By C. G. Grey

(Founder and Editor of "The Aeroplane," 1911-1939
Compiler and Editor of "All the World's Aircraft," 1915-1941)

SO much is being published in all sorts of papers in these days about wonderful new inventions which are going to revolutionise aviation, and popularise air transport, that this seems a good time at which to take a look at the whole subject. Most of the stories and descriptions about these new inventions are sheer nonsense, because they either describe ancient ideas or impossible notions; and even when they are not nonsense they are not inventions either, but often just logical developments of things that exist.

Sometimes too, a so-called revolutionary invention is only the discovery of a way of doing something which people had been trying to do for a long time but couldn't find just how, or had not the material with which to do it. Starting at the wrong end of the story—the outstanding example of that sort of thing is the gas-driven turbine, whether it propels by pure jet re-action (or recoil) or by driving an air-screw through a train of gears.

Air Commodore Frank Whittle (who has recently been created a C.B.E., most deservedly) would be the last person to pose as a revolutionary inventor. But he has revolutionised flying by developing a gas-turbine that works. And even then his methods would not have worked if Rolls-Royce and British Thomson-Houston had not developed metals which would stand up to something very like the blast of a high-pressure blow-lamp, or acetylene welding jet.

Whittle's own stories of his development are most amusing. Thomson-Houston's were afraid that his turbines, buzzing at 15,000 r.p.m., would burst and wreck one

of their shops. They were brave in the first place to take on making the thing at all. So they sent him and his enthusiastic crew of experimenters to the little town of Lutterworth, where B.T.H. had an old workshop vacant.

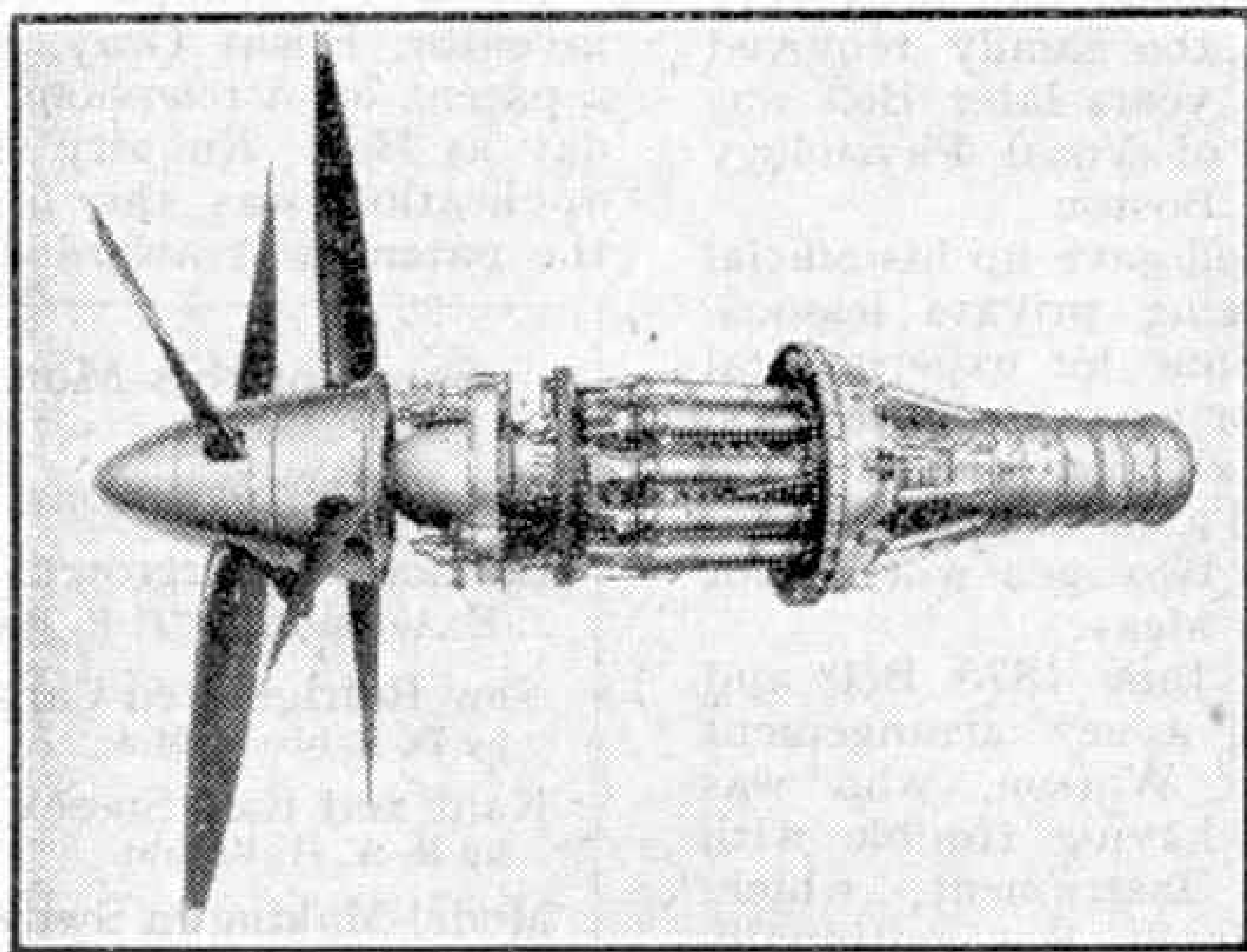
Whittle told me that they had been working there for a year or more before they discovered that Lutterworth was the place whence John Wycliffe, the vicar, had started to revolutionise religion and had founded the Protestant Church by translating the Bible into English. He said that they were greatly encouraged by the thought that another revolution might start at Lutterworth. I suggested that Wycliffe was not thinking in terms of 15,000 revolutions per minute—one per century was nearer his rate.

Anyhow, even when Whittle got his turbines and his jet propulsion working,

the heat used to melt the blades of the rotors. Jerry Sayers, the first pilot who flew a jet-plane, made by the Gloster people who now make the record-holding "Meteor," told me that it generally happened after about half an hour's flying—that was away back in 1941 or 1942. I asked him what happened then,

thinking that the molten metal might fly out centrifugally and break things. He said: "You just stop going places and glide down to land." Jerry was that sort of quiet humorist, and an awfully good chap. He was killed in a collision in a cloud over the sea with another fighter-plane, both with ordinary engines, not jets.

The last touch to jet-turbines was given by the development, by the Monel Metal Co., of a metal which will stand up to that



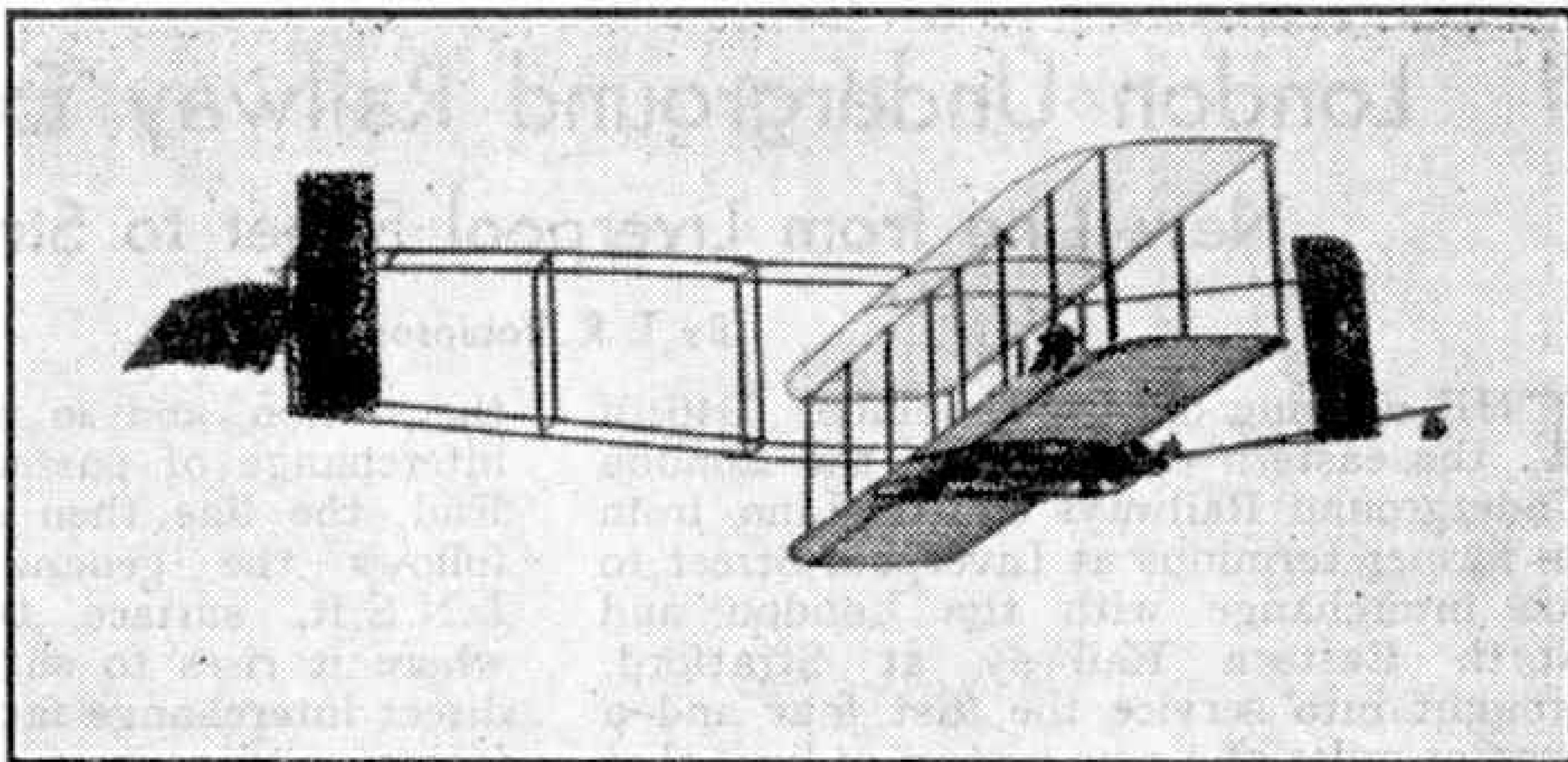
One of the British gas turbines now in production. The Armstrong-Siddeley "Python," which is to develop 4,300 h.p.

fierce heat indefinitely. It is available to all gas turbine makers—Rolls-Royce, Armstrong-Siddley, Metrovickers, B.T.H., Bristol, or anybody who is making such things. There has been no invention anywhere, it has all been plain development. I remember talking about gas turbines at Brooklands in 1911 to W. H. Sayers. He said that gas turbines had run long before that, but had always melted in about half a minute.

The gas turbine was an obvious development from the steam turbine, with which the Hon. Charles Parsons (son of Lord Rosse) and Horace Short, the eldest of the Short Bros., of flying boat fame, shook the British Navy to the core, when their little "*Turbinia*" chased and passed and left standing the Navy's crack destroyer at Queen Victoria's Diamond Jubilee Review at Spithead in 1897. And the steam turbine is, after all, only a logical development of a windmill.

The revolution comes from the "Know-how," and from all the little gadgets which are genuinely invented to make the thing work. For example the pneumatic tyre is a fairly obvious thing. It was first produced in 1840 by one Thompson, but horse-users didn't want it, and there were no bicycles then and rubber was expensive. J. B. Dunlop re-"invented" it in 1888, but it did not get going until Charles Kingston Welch really did invent, and patented, the endless wire and well-bottomed rim which we all use to-day on cycles, motor-cars, and aeroplanes. That was another revolutionary development which succeeded because somebody also invented a simple thing which made it work. And, mind you, a patented article is not necessarily an invention. You can patent an improvement on an existing development or invention or patent, and so stop other people from going on improving the thing your way. I have known lots of men who made a good living by doing just that.

But to go back to Air Inventions. The aeroplane itself was not an invention. Probably long before Icarus and Daedalus



An early Wright Brothers' glider, flying at Kitty Hawk, U.S.A.

people had tried to glide with artificial wings—there are legends of them from China and from the early Britons and Italy and other places. The Wright Brothers were the first people to do catapulted engine-assisted hops on a biplane. But many others were gliding before them. And a Nova Scotian in the U.S.A., Casey Baldwin, got off the ground with one engine, but without a catapult, before the Wrights did so.

Where the inventions came in was in the methods of controlling aeroplanes. The Wright Bros. controlled their machine laterally by warping (that is altering the curve of) their wings with wires, worked by a hand-lever, which moved fore and aft. On top of it was a short lever which moved sideways and worked the rudder. On the opposite hand was a lever which worked the fore-and-aft elevators.

That curious arrangement was patented, and was revolutionary to the extent that nobody had flown till then, so nobody had invented any other form of control. Then Glenn Curtiss and others in the U.S.A., and Blériot and Farman and others in Europe, developed flaps (called ailerons) instead of warping wings, but they were not patentable. Then Robert Esnault Pelterie in France patented, and claimed to have invented, a control by which a control stick (or control column) worked the elevators fore and aft, and by moving it sideways the pilot warped the wings or worked the ailerons. The rudder was worked by a rudder-bar, placed thwartships like the handle-bars of a bicycle, only it worked the opposite way.

The Wrights claimed that it infringed their patent because the pilot's arms, body, and legs formed a mechanical connection between the control of the wings, and the control of (Continued on page 142)

London Underground Railway Extension

New Line from Liverpool Street to Stratford

By T. R. Robinson

THE opening on 4th December 1946 of the eastern extension of the London Underground Railways Central Line, from its former terminus at Liverpool Street to the interchange with the London and North Eastern Railway at Stratford, brought into service the first four and a quarter miles of a new system of lines that will help considerably towards the solution of one of the worst traffic problems in London. Not only is this the first big undertaking of its kind to be completed since the war, but it is also one of the most notable of British engineering triumphs of recent years, for its construction involved tunnelling under conditions of exceptional difficulty.

The general scheme, of which the new extension forms a part, was first planned as long ago as 1935. One of its objects was bringing the travel facilities available in north-east London into line with those of other parts of the Metropolis, and, but for the war, the whole of this "£40,000,000 scheme," including lines to Epping and Ongar, and a loop via Hainault, would have been in service some years ago. At present, the lines are incomplete, though it is hoped that they will be opened throughout by 1948.

The route of the extension to Stratford continues directly from the existing Central Line station at Liverpool Street, and runs in a north-easterly direction to its first station at Bethnal Green, after which it turns roughly south-east on its way to Mile End. Here it rises to the level of the District Line, with which it shares

the station, and so provides for the easy interchange of passengers. Leaving Mile End, the line then descends again, and follows the general direction of the L.N.E.R. surface tracks to Stratford, where it rises to surface level and gives direct interchange facilities with L.N.E.R. trains.

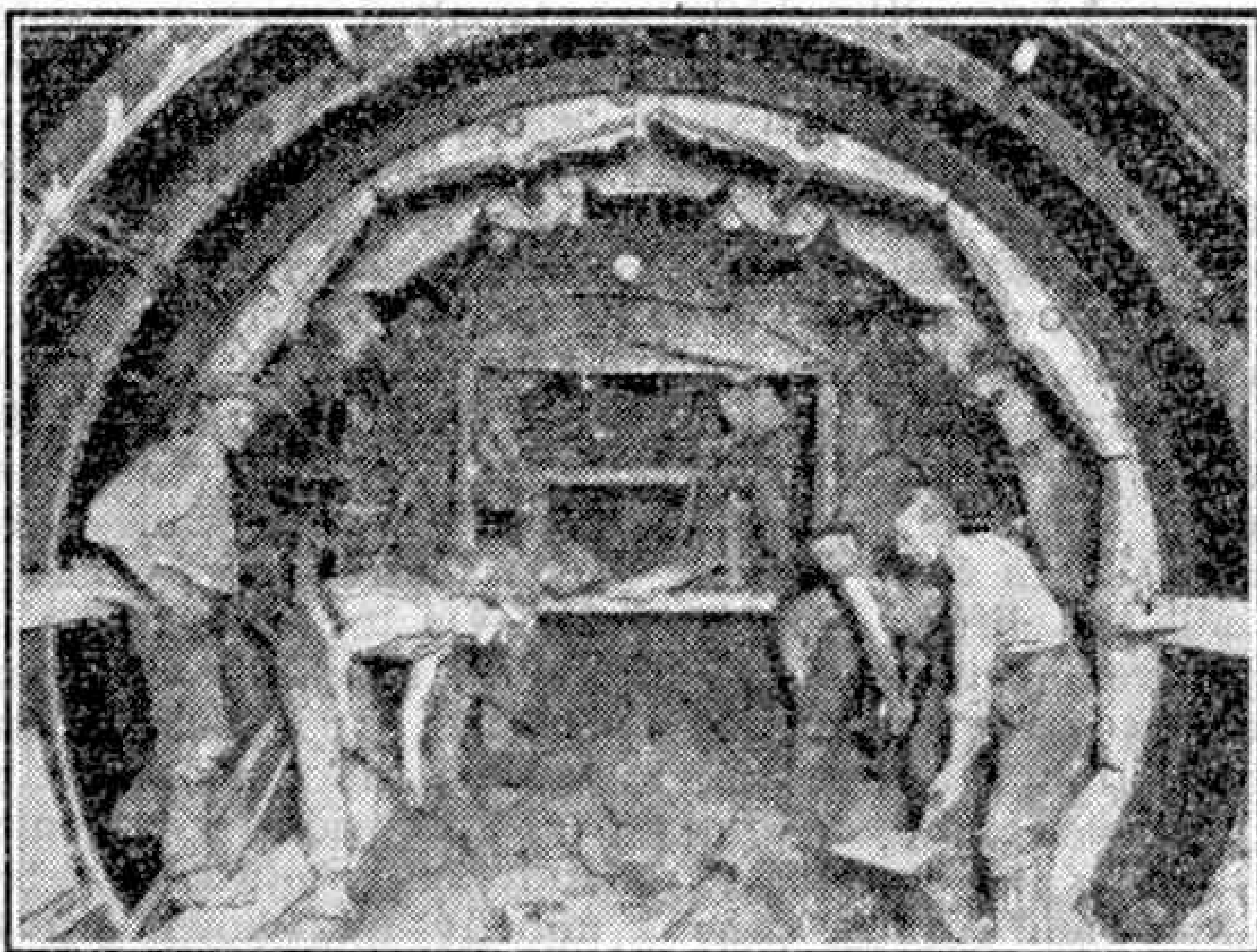
From an engineering standpoint, the Liverpool Street to Stratford section is the most interesting part of the whole extension scheme. The first mile and a third to Bethnal Green Station is driven through London clay, which presented

no unusual difficulties of construction, but beyond this point things were very different, for the soil changes to loose ballast. This was so porous that the usual method of keeping the water out of the workings by means of compressed air could not be adopted.

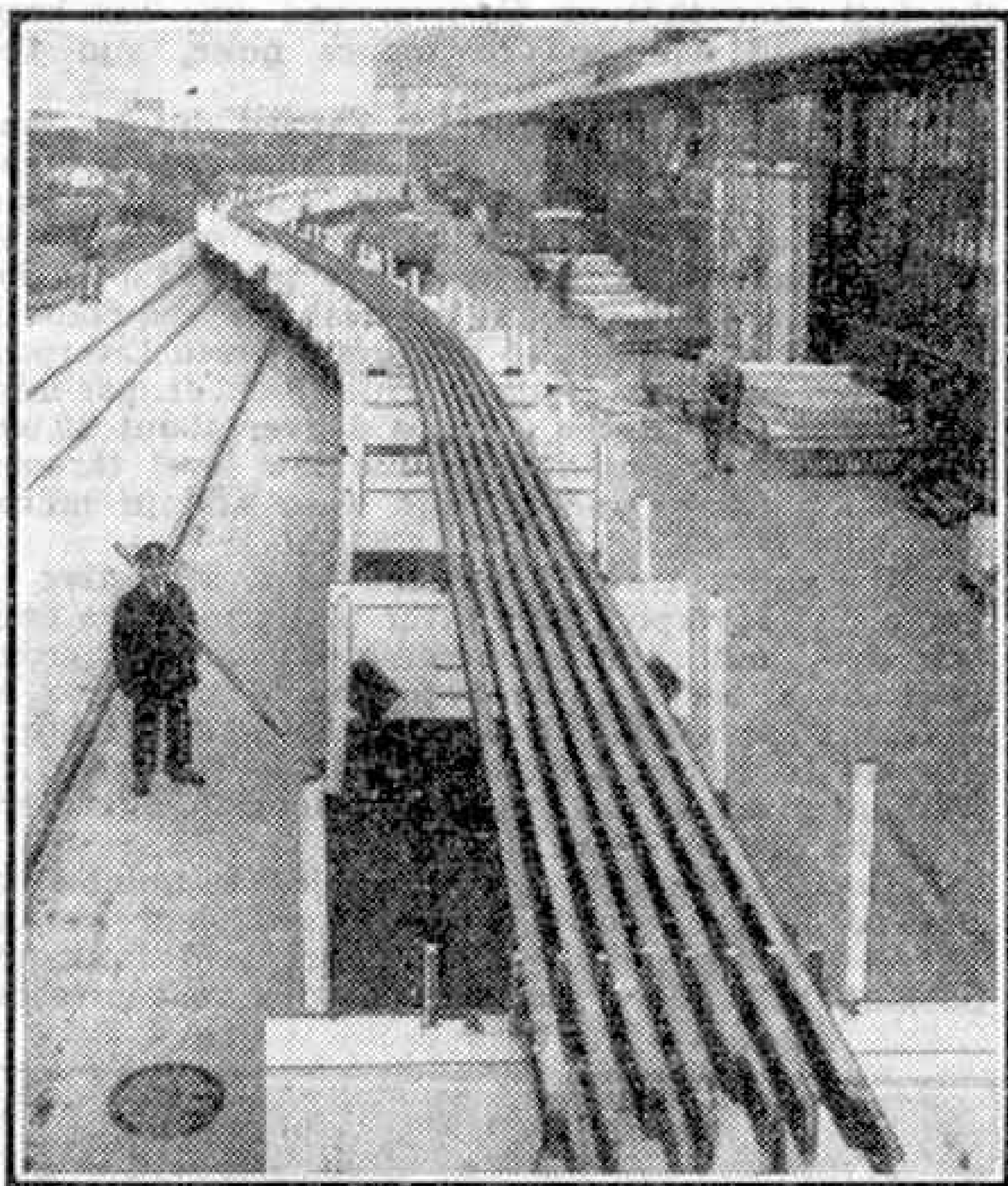
To overcome this difficulty it was necessary to employ

chemical consolidation at a number of points before any constructional work could be proceeded with. A pilot tunnel was driven first, and from this pipes were inserted into the soil above through holes in the upper part of the pilot tunnel walls. By means of these pipes, a solidifying material was then injected into the surrounding porous soil, consolidating and waterproofing it, and so enabling the main tunnels to be safely driven.

When Mile End Station was reached, further problems presented themselves. In order to provide for the new Central Line platforms alongside the existing platforms of the District Line, the station



Tube tunnelling in progress with the aid of a shield driven ahead by compressed air rams. The photographs illustrating this article are reproduced by courtesy of the London Passenger Transport Board.



Rails welded together in 300 ft. lengths ready to leave Lillie Bridge Depot of the L.P.T.B. The rails are fixed to the wagons and adapt themselves to curves during transit.

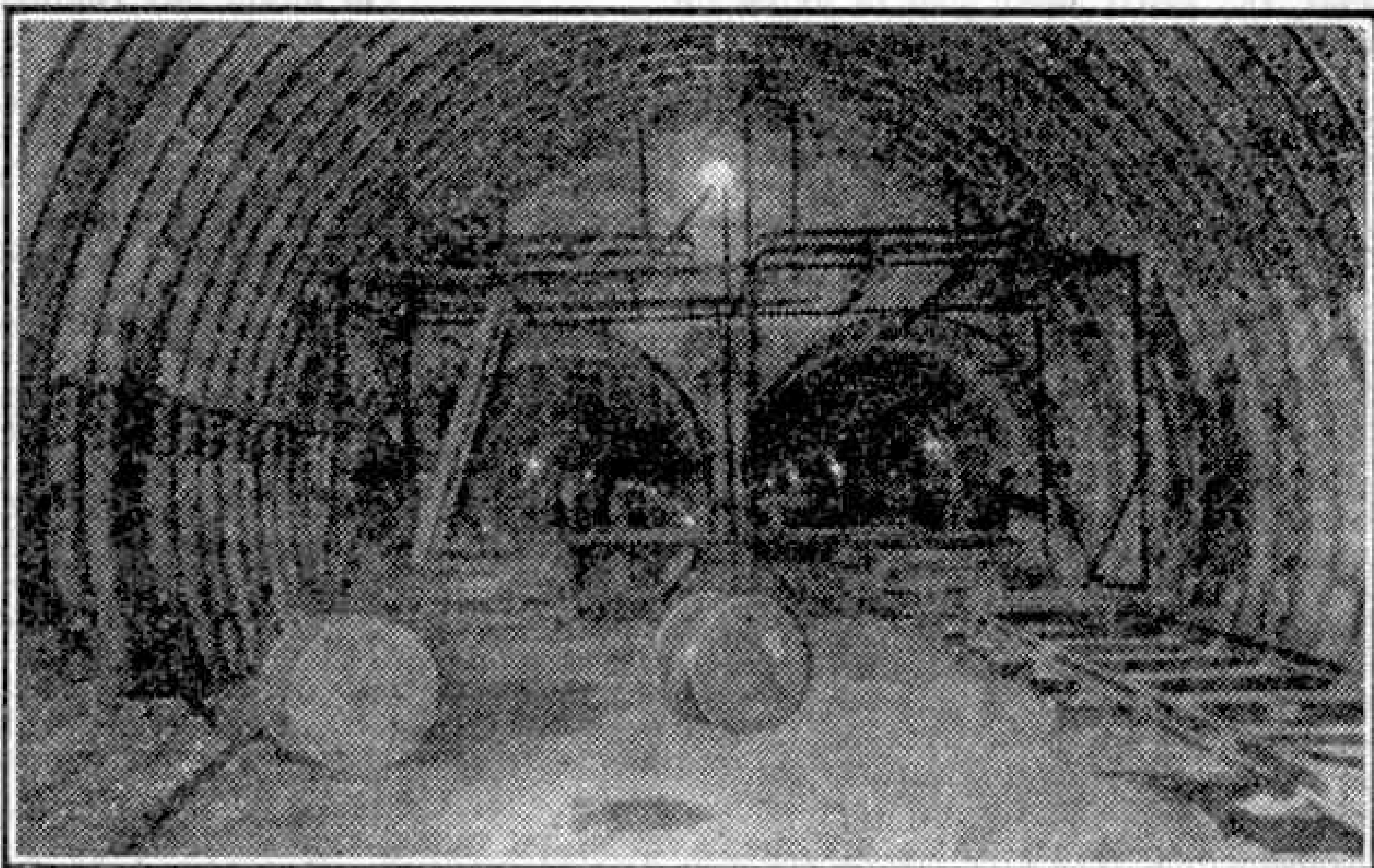
had to be enlarged. Half of the work was beneath the Mile End Road, a busy thoroughfare that could not be opened up, and an alternative method had to be devised. Small transverse tunnels were dug below the road surface, and then vertical holes were drilled down into the earth. These were filled with concrete to form pillars, and on top of them were laid heavy girders which in turn supported the road. All this very exacting and difficult work, with the subsequent excavation of the space for the new platforms, was carried out without any interference with the almost ceaseless traffic on the road above.

Road traffic was not the only thing that had to remain free from interference, for at one point near Mile End the tunnels pass only nine feet below the foundations of a bank. Had there been the slightest subsidence as excavation took place, or any error in the subsequent constructional work, the resulting distortion would almost certainly have caused the door of the bank safe to jam. So carefully was the work done that the foundations were not disturbed, and

the safe door opens and closes as well as ever!

Beyond Mile End Station, the line enters the district of the old East London Marshes, and the same sort of difficulties that were met with between Bethnal Green and Mile End were repeated in a more intensive form. In order to get greater cover overhead, it was decided to locate the line under the embankment which carries the L.N.E.R. main lines, but even then tunnelling had to be undertaken in compressed air. The soil was so waterlogged that the engineers described some parts of it as "like pea-soup," and air pressures as high as 25 lb. per sq. in. had to be used.

At one point an even greater snag presented itself. The L.N.E.R. lines under which the tunnels were being driven cross the City Mill River at Stratford Marsh by a bridge, and so at this place there was not only no embankment, but the bed of the river made a sort of cutting, which came down to within a few feet of the roofs of the tunnels. To deal with this, the chemical consolidation method was again employed, the river bed being attacked simultaneously from above and below. Pontoons were moored in the middle of the river, and from these pipes were lowered down into the mud. Solidifying liquid was then forced down through the pipes into the river bed, and at the same time more of the solidifying liquid was forced upward through pipes fed from a pilot tunnel driven under the river. By this means, a sort of canopy of a substance resembling stone was formed in the mud and marshy ground. Beneath this the tunnels could be safely constructed,



Erecting steelwork for the cables at Liverpool Street. The twin tubes here open out into a single larger tunnel in order to allow for the installation of crossover points.

despite their relatively shallow depth below the bed of the river.

There still remained another tough problem to be overcome before Stratford Station was reached. This was at the point where the L.N.E.R. lines are carried over Carpenters Road by a bridge. Here the tube tunnels are rising to the level of the L.N.E.R. tracks, and they are so near to the surface that it was impossible to use compressed air in driving them. Once more the resource of the engineers overcame the difficulties. First the foundations of the bridge were strengthened and reinforced, after which the roadway was dug out to form a trench, and the walls lined with steel piling. This formed a sort of "box," which was then filled in with concrete to provide a rigid mass of material through which the tunnels could be constructed in safety.

At the point where the rise of the tunnels brought them to a level of about 10 ft. below the L.N.E.R. tracks, tunnelling was discontinued and replaced by "cut-and-cover" construction. As its name suggests, this consists of excavating a cutting and then roofing it over, and as the lines continued to rise, the covering was omitted and the tracks were laid in an open cutting.

Special platforms are provided at Stratford Station for the use of the Underground trains, but as they are on exactly the same level as those of the L.N.E.R. lines, the interchange of passengers is a simple matter. Beyond Stratford Station the Underground again descends and when the lines are complete, it will run on to Leyton, where it finally comes to the surface to join the Loughton line of the L.N.E.R.

The equipment of the tunnels and stations on the extension includes some very interesting and novel features. Amongst these are the measures taken to obtain quieter running. Noise has always been a nuisance on tube railways, and London Transport engineers have carried out a lot of research into methods of reducing it. Most of the noise comes from the rails, wheels and bogies, and in the tunnels of the new line, two methods of cutting it down have been adopted.

One of these methods is the use of rails welded together to form long lengths in order to avoid the continual clatter of the wheels on rail joints. As the temperature in tube tunnels varies little between winter and summer, the usual small gap to allow for expansion is not necessary, and on the Stratford line the rails are laid down in lengths of 300 ft. Greater lengths could have been used but for the difficulty of transporting them, and even the 300-ft. rails required to be very carefully loaded and secured on the rail wagons used to carry them. The reason for special precautions was that the rails had to bend whilst in transit to conform to the curves of the line over which their special train travelled. If they had not been fastened to the trucks at several points, spaced along the length of the train, they would have tried to remain straight, with distinctly awkward results! The laying of such lengths of rail in the limited headroom of the tunnel also presented difficulties, but these were overcome by the use of lifting tackle suspended from rails fixed to the tunnel roofs.

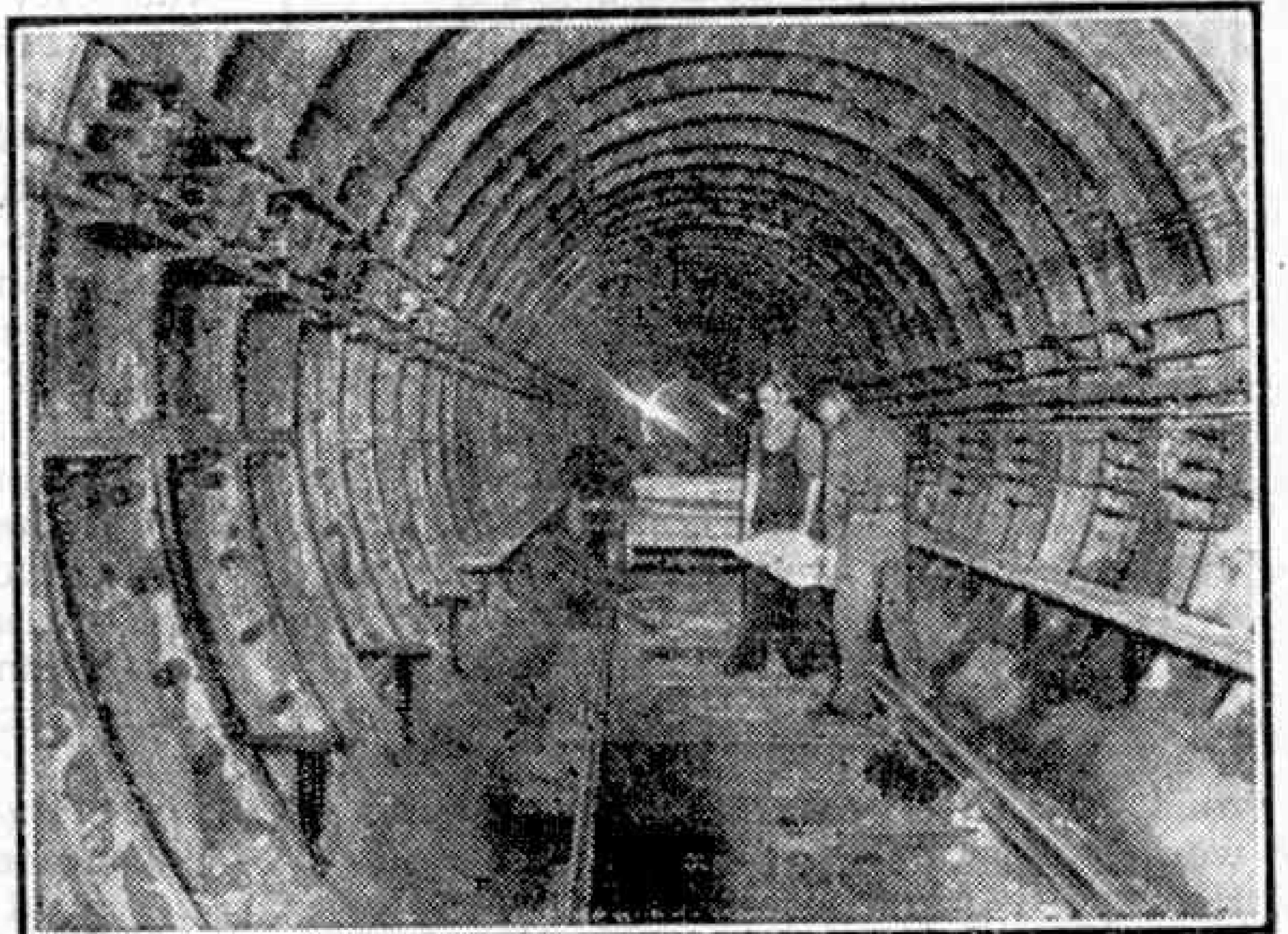
The second method of noise reduction consists of mounting slabs of a special sound-absorbing composition on brackets attached to the tunnel sections in such a way as to form a continuous shelf along both sides of the tracks, just above the line of the bogies. The slabs, which are made up of an outer layer of asbestos, with an inner core of an asbestos and magnesium composition, absorb about 80 per cent. of the sound which falls upon them. It is

the first time that an Underground line has been planned and equipped to reduce noise, and the results seem quite effective.

Ventilation of the tunnels is carried out by four plants, situated between the stations. Large fans extract the warm air through special shafts, and fresh air enters the tunnels through some of the original working shafts, which have been adapted for the purpose. The amount of fresh air required to give proper ventilation to the line between Liverpool Street and Stratford is about 570,000 cu. ft. per min. Additional fans at the stations deliver about 20,000 cu. ft. of air per minute to the low level through grids in platform and passage walls and in offices and other rooms.

The stations are both efficient and attractive in design. At Liverpool Street, the platforms have been extended, and shunting accommodation and cross-overs have been provided to enable trains to be reversed at this point. New ticket halls and escalators also are to be constructed to give better access to the Central Line, and improved interchange facilities with the Metropolitan Line.

Bethnal Green Station resembles a number of stations in the central London area, and has no surface buildings. Three escalators lead from the booking hall, below street level, to a concourse be-



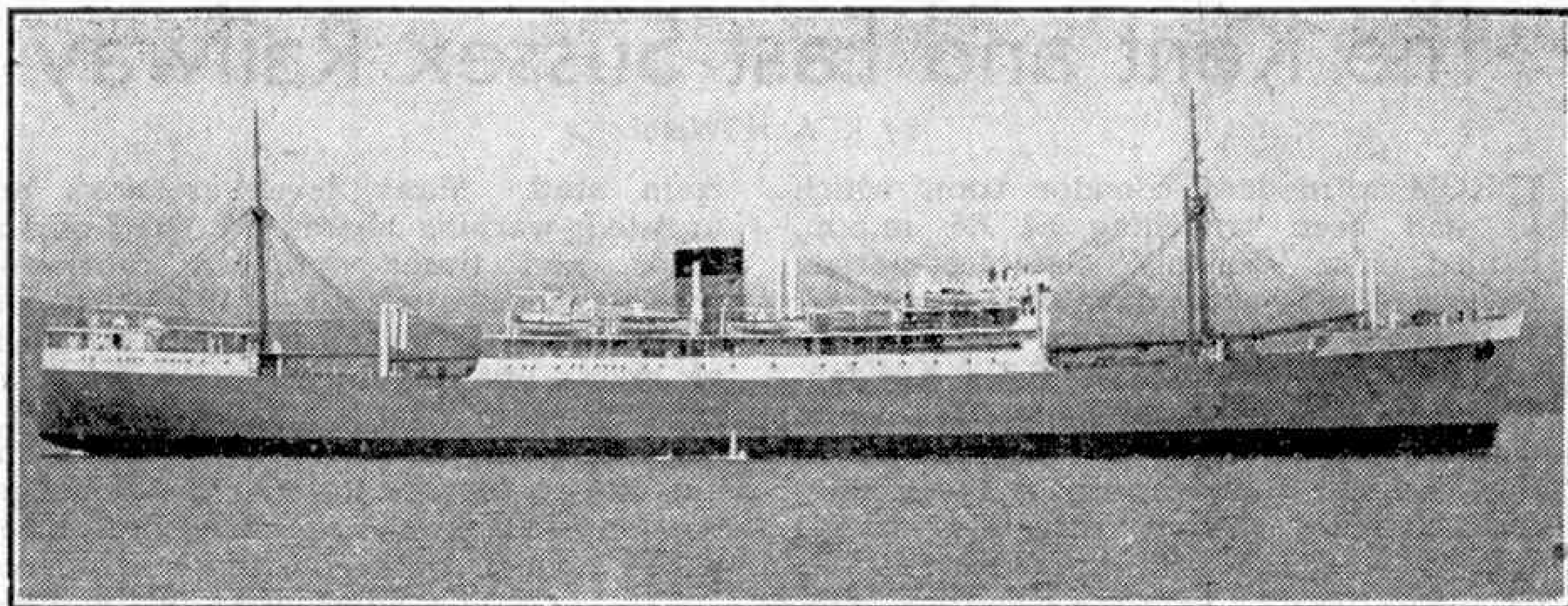
Fitting shrouding material at the tunnel sides. This shrouding helps to damp out running noise from the wheels.

tween the two wide 420-ft. platforms. The station's clocks have twelve "Underground" circle-and-bar motifs on their dials in place of the usual numerals, and the hour hands also bear the same symbol. Fluorescent lighting is installed throughout, and the slight flicker that is sometimes noticeable with individual tubes is avoided by wiring on two circuits with the alterations of current staggered.

At Mile End, the platforms for the new lines are really only additions to the already existing structure. L.N.E.R. platforms already constructed for steam trains are used at Stratford, and some new station buildings, designed to make these platforms more suitable for Underground trains, are still in process of completion.

Some idea of the work necessary in the construction of the extension can be obtained from the fact that 325,000 tons of soil were excavated during its building. If piled up, this would make a great heap three and a half times the size of the London Transport headquarters building at Broadway, Westminster.

The new line brings east and north-east London into far better and more rapid communication with Central London and the West End. Every day 456 trains will run over the extension, (Cont. on page 142)



A New Refrigerated Cargo Liner

By Denis Rebbeck, M.A., M.Sc., B.Litt., M.I.N.A., A.M.I. Mech.E.

A VERY useful addition to the "Empire Food Ships," as our refrigerated cargo liners have become known, is the M.V. "*Port Hobart*." This fine vessel left the Belfast shipyards recently and sailed for Australia to collect her first cargo and thus swell the nation's larder. The "*Port Hobart*" was laid down by Harland and Wolff Limited during the war, for the Merchant Shipbuilding Department of the Admiralty, and launched in December 1945 under the name of "*Empire Wessex*." In due course the vessel was offered for sale by the Ministry of War Transport under the disposal scheme, during the spring of 1946, being quoted as a refrigerated ship of 12,000 tons deadweight with a speed of approximately 17 knots.

The "*Empire Wessex*" was bought by the Port Line, who suffered heavy losses of refrigerated ships during the war. The sister ship, the "*Empire Mercia*," launched in March 1946, was purchased at the same time by the Blue Star Line and renamed "*Empire Star*." Such fine vessels as these are eagerly sought by the leading British shipowners who are anxious to replace their wartime sinkings, and who readily appreciate that if they have to wait until a new ship is built and fitted out it will be many months before it will be in service. The Government, too, are anxious that such vessels as the "*Port Hobart*" and "*Empire Star*" should be in service so that meat and fruit, as well as general cargo, may be brought to feed the nation and fill the shops. Finally there is the shipbuilder, who is anxious

that the splendid products of his skill and enterprise should be quickly manned and sail the seven seas to act as a floating advertisement for the heavy industries in the British Isles.

The "*Port Hobart*" is a graceful and modern-looking cargo liner, with numerous derricks for quick loading and discharging of the precious cargo; one short "motor-ship" funnel, a cruiser stern and all the most up-to-date equipment. The refrigerated cargo space amounts to 503,000 cu. ft., out of a total cargo capacity of 667,000 cu. ft. The refrigerating machinery-room is entered from the top of the engine room. In it there are three CO₂ refrigerating compressors, each machine having two single-acting compressors driven by a 160 b.h.p. variable speed electric motor directly coupled to the crankshaft. These machines deal with the frozen and chilled cargo in 14 separate 'tween deck and hold spaces, as well as a set of provision chambers for the ship's own domestic purposes.

Passengers are carried in two classes, 36 first class and 92 tourist class; and in each class accommodation of a remarkable degree of comfort has been provided. When it is remembered that the speed of this ship is not much less than that of the regular mail ships on the Australian run, it will be understood that the "*Port Hobart*" will make a useful contribution to the problem of finding passages for those who are eagerly awaiting transport between this country and Australia. The port of registry of this vessel is London.

The Kent and East Sussex Railway

By R. A. H. Weight

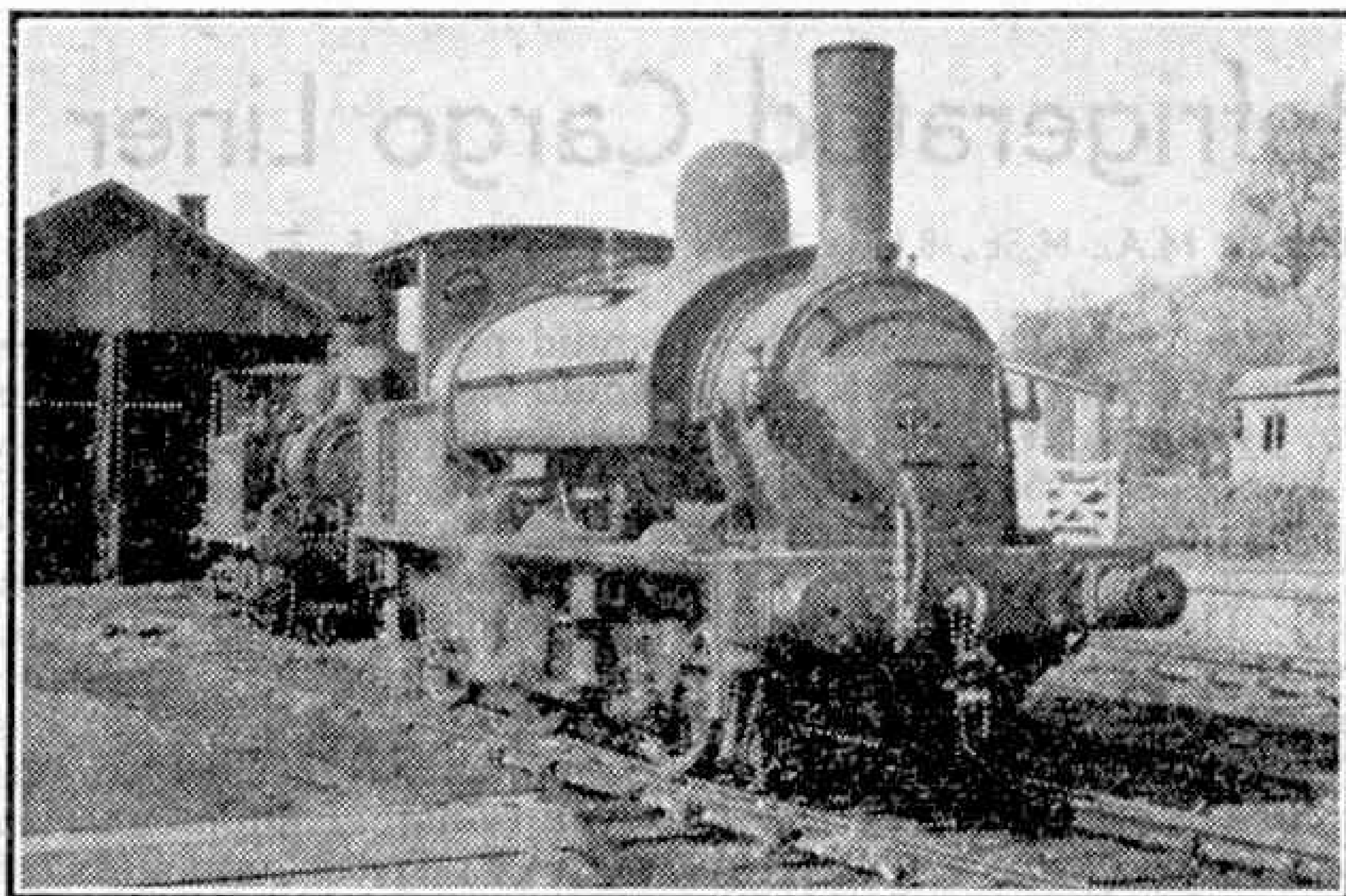
FROM a modern corridor train which had been travelling at 65 m.p.h., hauled by a "Schools" class locomotive, on one of the sunny days of last summer I alighted at Headcorn, a four-track country station on the S.R. London-Folkestone-Dover main line. There connection is made with the Kent and East Sussex Light Railway, one of the remaining standard gauge privately owned railways. The K.E.S. has little that is

train staff. Many level crossings are ungated; warning boards are fixed on the roads, and trains approach cautiously with locomotive whistle in full blast. The track is by no means innocent of weeds or grass, but has been partly relaid in recent years. The trains are "mixed," carrying both passengers and goods. The one or two coaches forming the passenger portion run next the engine and are fitted with vacuum brake. Unbraked wagons follow as traffic requires.

On the occasion of my visit one coach and three wagons formed the mid-day train from Headcorn, and it was hauled by a small "P" class 0-6-0T numbered 1325, of the Wainwright former S.E. & C. type used mainly for harbour or similar shunting duties on the S.R. From this company No. 1325 was on loan, complete with their white route discs and a duty number, 355, which really applies to a big "J" 0-6-4T working. We had no guard, the fireman officiating *en route* as required.

As there was no intermediate shunting or freight work, and few passengers, good time was kept through the undulating Kent Weald amid orchards and hop fields. On arrival at Tenterden the wagons were given a push into sidings, and then after we had alighted the engine and coach went down the hill to Rolvenden for the lunch and afternoon interval. The two-road engine shed there has room for four locomotives, with a repair shop attached, but little in the way of power equipment, so the fitters have to rely largely on their own resources. There is a one-coach carriage shop, some store buildings, two hand-operated travelling cranes of early vintage, and an erstwhile North London brake van with elevated look-out window used as a store.

Of the present K.E.S. locomotives No. 3 was purchased from the London, Brighton and South Coast in 1901. On that line



No. 4, a Beattie saddleback tank locomotive, at the Rolvenden depot of the Kent and East Sussex Railway. Behind is No. 3, a Brighton "Terrier." The illustrations to this article are from photographs by J. F. Taylor.

modern about it. Indeed, one steps as it were straight into a rural world of long ago when travelling on this entertaining little line, which is $21\frac{1}{2}$ miles long and at its southern end, at Robertsbridge, Sussex, connects with the S.R. Hastings direct line, where freight traffic is regularly exchanged, and passengers and parcels are transferred. The principal intermediate station and country town is Tenterden, 8 miles from Headcorn.

The line is single throughout, with passing places and sidings at a number of stations, which are nearly all diminutive structures in agricultural country where there is little population. There are some smart signals, though they are seldom used or heeded, as except on the two mile Tenterden-Rolvenden stretch the railway is operated in two sections on the "one engine in steam" basis. The driver must of course be in possession of the appropriate

she was No. 70 "*Poplar*," of the famous "*Terrier*" 0-6-0T class built to Stroudley's diminutive but tough design in 1872 for South London suburban work. Her

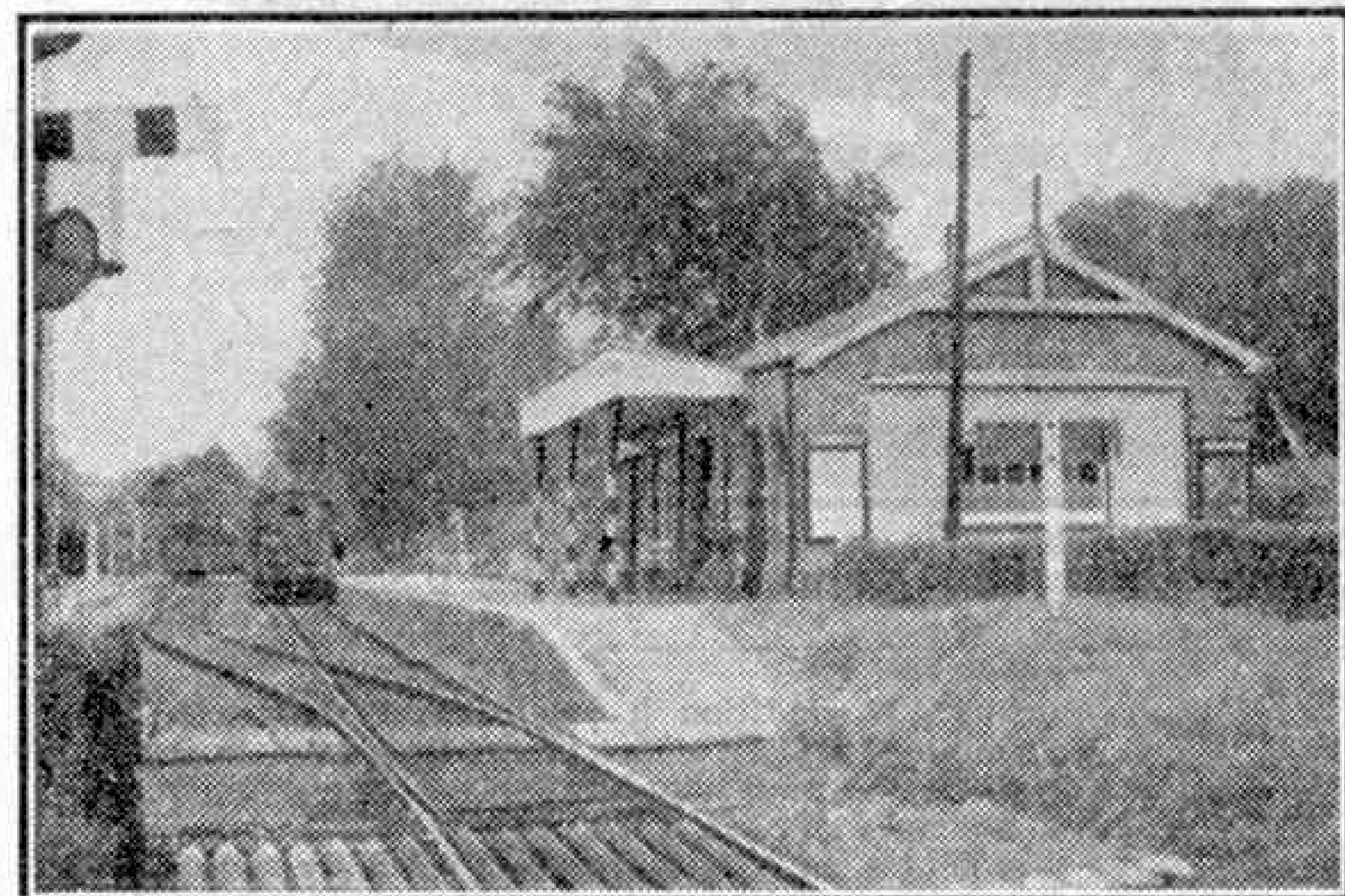
mentioned at the beginning of this article, returned to her home ground on the arrival of No. 2678.

K.E.S. 1 and 2 were 2-4-0Ts named "*Northiam*" and "*Tenterden*"; they were built in 1900. Nos. 7 and 9 were "*Rother*" and "*Juno*," old "*Ilfracombe goods*" L.S.W.R. 0-6-0 tender engines acquired in 1910 and 1914. No. 8 "*Hesperus*" was built in 1876 for a small Welsh line and bought from the G.W.R. in 1913. All these now have been scrapped, as have one early steam railcar and two larger petrol ones, which were far from luxurious. The company's six ex-L.S.W. coaches seen, of which two were corridors not in use, are smartly painted and lettered very much in S.R. style.

After an interesting stay at Rolvenden where every

facility was cheerfully accorded by courtesy of the Engineer and Manager and his local foreman, the journey over the southern K.E.S. section to Robertsbridge by the last train from Tenterden at 4.30 p.m. was begun with locomotive No. 4, two carriages and six wagons. It was a busy train in hop-picking time. We were shunted about at several stations until the cavalcade over the last 2½ miles consisted of the panting "*saddleback*," two well-filled coaches and a tail of 19 loaded or empty wagons!

At Robertsbridge I congratulated the driver on his handling of a hard trip and bade a reluctant farewell to him and his fascinating railway.

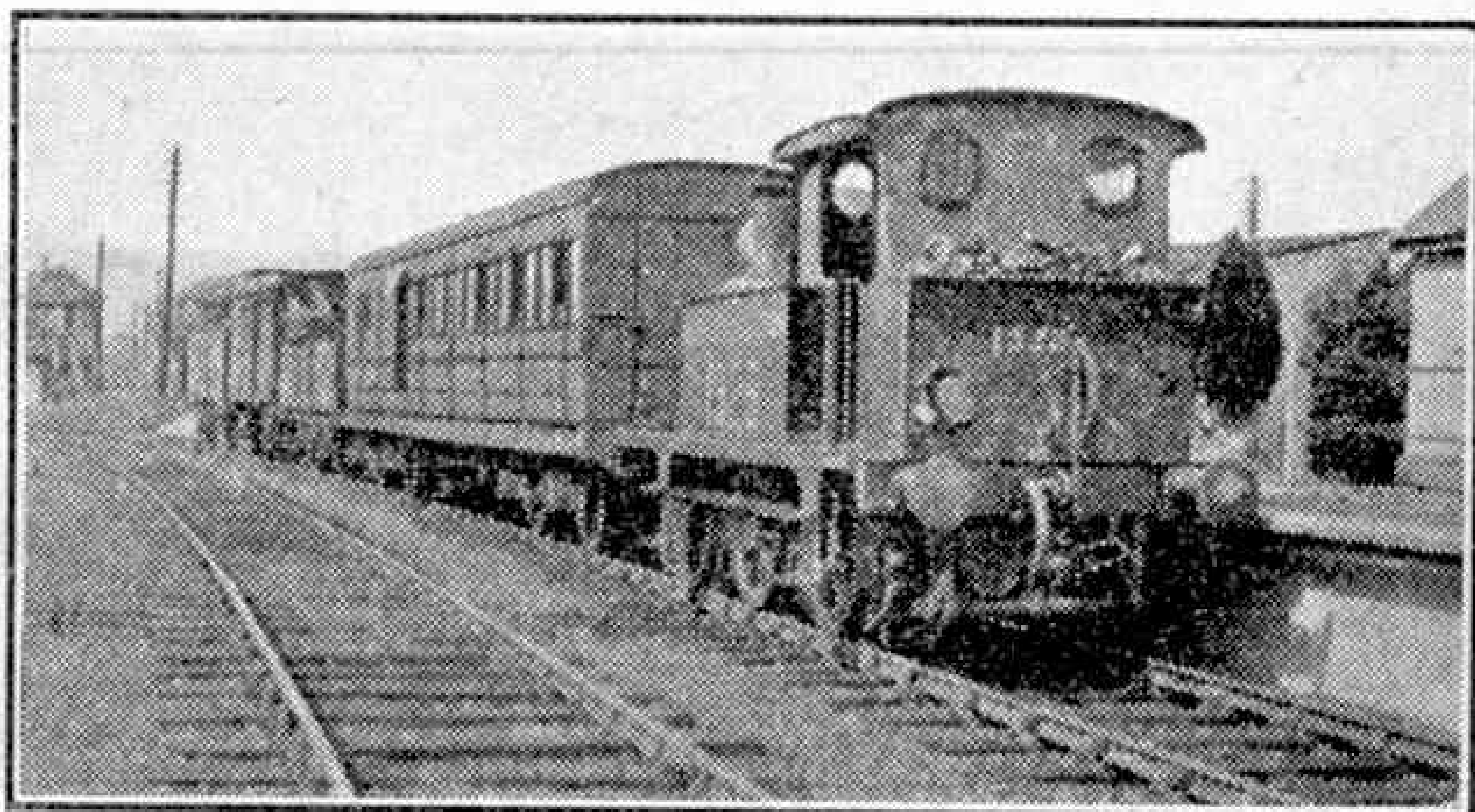


Tenterden station, the principal intermediate passing place on the K.E.S.R. In the foreground is a cattle guard.

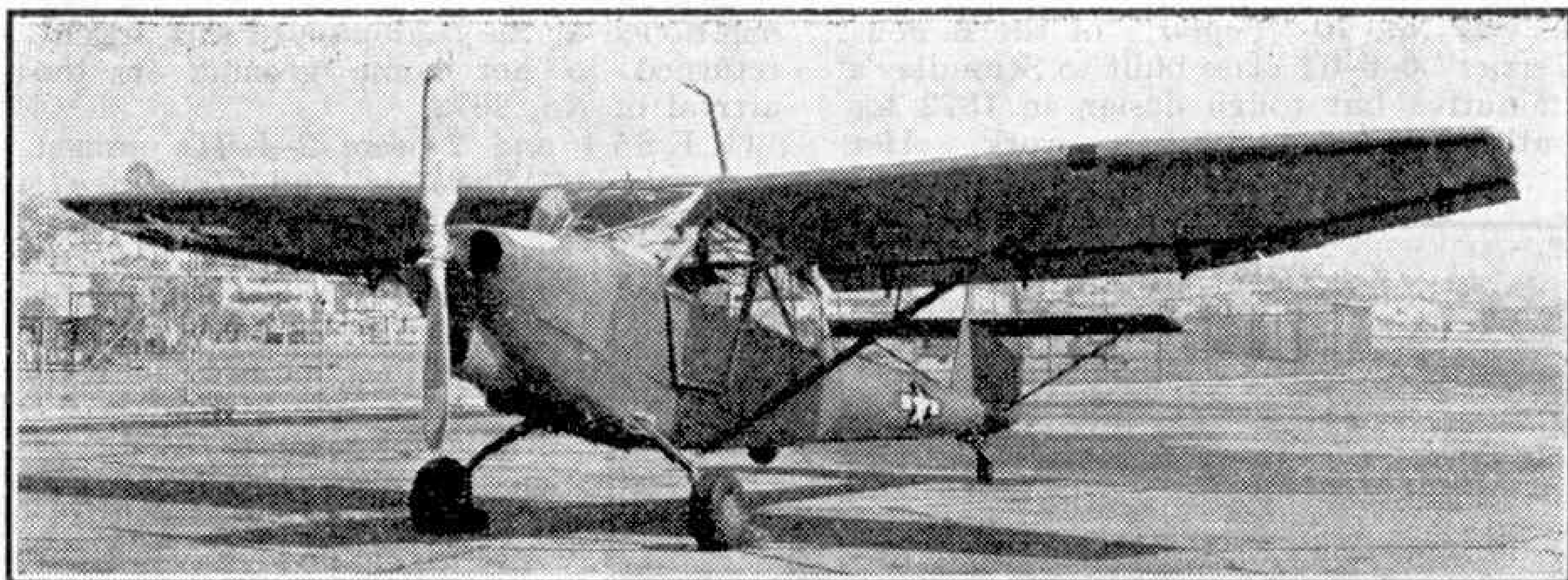
K.E.S. name "*Bodiam*" has now been removed and at the age of 74 she is still going strong, having been re-boilered locally to "*A1x*" standard and more recently overhauled at St. Leonards S.R. depot. No. 4 is a Beattie, Beyer-Peacock 0-6-0T of the former London and South Western "*saddleback*" type; she too is a septuagenarian, having come to the K.E.S. in 1932 with a bogie coach in exchange with the S.R. for 0-8-0T "*Hecate*," which was built for the local line in 1904 as No. 4, but found too heavy for certain bridges or sections of track.

Years ago K.E.S. engines were painted blue, rather like the old Great Eastern hue. Then some were bright green, and now a dark green dress is worn by Nos. 3-4.

There are two S.R. engines on loan to the K.E.S. One is No. 3440 of the L.S.W.R. Adams 0-6-0 tender type. This has been there some time to assist with increased wartime traffic, which was also worked for a while by an "01" Stirling 0-6-0 from Ashford. The other Southern is now No. 2678 "*Terrier*," repainted in latest black style after overhaul in Ashford Works. No. 1325,



Headcorn-Tenterden train headed by an S.R. 0-6-0T on loan. This photograph was taken at Headcorn.



The Consolidated Vultee L-13 liaison aircraft, now in big-scale production for the U.S. Army Air Forces. Photograph by courtesy of the Consolidated Vultee Aircraft Corporation, U.S.A.

Air News

By John W. R. Taylor

An Interesting Liaison Aircraft

The new Consolidated Vultee L-13 liaison aircraft is literally an aerial jack-of-all-trades. It is an all-metal high wing monoplane, powered by a 245 h.p. Franklin engine, and is in big-scale production for the U.S.A.A.F. in Convair's San Diego factory. Its folding wings are an unusual feature for a land-based aircraft, but they enable it to be towed along ordinary roads or overland by standard military vehicles, or even to be packed into a truck without being dismantled. To lessen still further its width with wings folded the main wheels can be pivoted inwards, giving a track of only 61½ in.

The big wing area of 270 sq. ft. and its large flaps combine to give the L-13 remarkable take-off and landing characteristics. It can take off in only 230 ft., and it will land in only 227 ft. at a speed of 43.5 m.p.h. The L-13 also can be towed into the air, glider fashion, by another 'plane and then released in flight at a speed of some 150 m.p.h. to proceed under its own power.

Obviously such a versatile aircraft has many uses, and the U.S.A.A.F. plan to employ it on observation, communication, photographic, aerial pick-up, supply-dropping, wire laying, courier and light transport

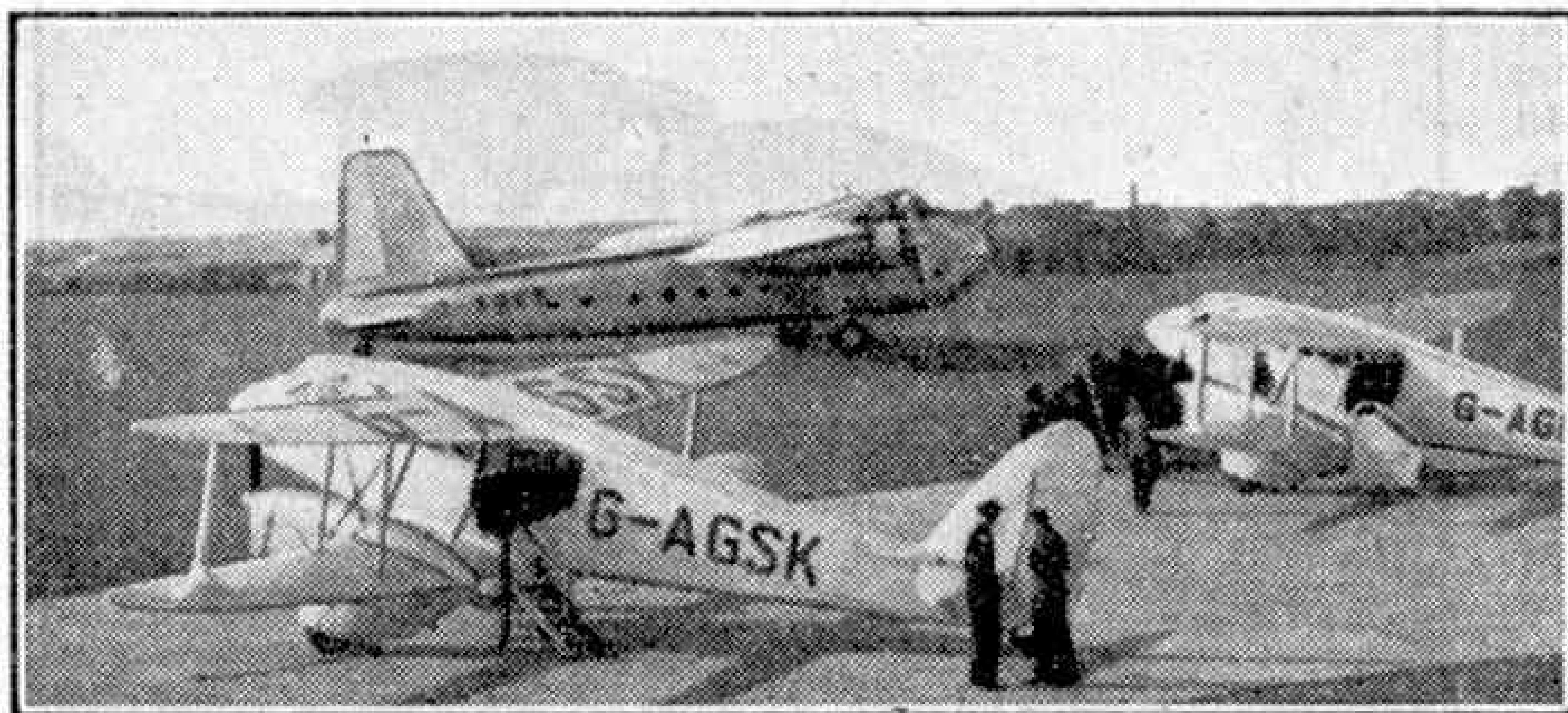
duties. In addition it can easily be converted into an ambulance with accommodation for two stretcher patients, a pilot and nurse. Although designed for a normal crew of three, the L-13 can carry up to six people in an emergency. Skis can be quickly fitted instead of wheels, and the main undercarriage is also interchangeable with floats.

B.O.A.C. Post-War Achievements

A good idea of the tremendous achievements of British Overseas Airways Corporation in the first full post-war year of civil aviation is given by the fact that, by its close, they were operating no less than 63 return services each week over a total of 122,798 miles. During 1946, B.O.A.C., in co-operation with associated companies, carried nearly 150,000 passengers, and flew a total of over 276,500,000 passenger miles and nearly 60,000,000 ton-miles.

With the formation of the British European Airways Corporation in August 1946, B.O.A.C. were relieved of the operation of the shorter European routes and were able to turn their full attention towards the continued development of their long-distance services to the Empire, U.S.A. and the Far East. As a result they were able to re-open the flying boat route to Australia, open the first British commercial services between London and New York, and Scotland (Prestwick) and New York, inaugurate the first stage of the "Dragon" route to the Far East with a weekly flying boat service to Hong Kong, open a further weekly flying boat service between Singapore and Hong Kong via Bangkok, and increase the service to Johannesburg to four (now six) weekly.

B.O.A.C. remain the largest airline operators in the world, and now possess a fleet of over 200 aircraft, consisting of about 40 Short flying boats and large numbers of "Lancastrian," "York," "Halton," "Constellation" and "Dakota" landplanes. This already fine fleet will be supplemented during this year by Short "Solent" and "Plymouth" flying boats. New landplane types to go into service will be the Avro "Tudor" I and II and Boeing "Stratocruiser" air liners.



Bristol "Wayfarer" transport of Channel Islands Airways about to take off from St. Peter's Airport, Jersey, for Croydon. Photograph by H. A. Breton, Keynsham.

First American Twin-Engined Helicopter

The McDonnell Aircraft Corporation, U.S.A., recently designed and built the world's first carrier-based jet fighter, the "Phantom." They have followed this up with another "first"—the first American twin-engined helicopter. This aircraft, designated XHJD-1, was designed by C. L. Zakhartchenko of the McDonnell Helicopter Division, in collaboration with the U.S. Navy's Bureau of Aeronautics. The prototype, shown in the upper photograph on this page, is being used for an extensive flight research programme to decide such things as the best rotor diameter, blade chord, rotor-engine gear ratio, gross weight and control sensitivity, for future production helicopters.

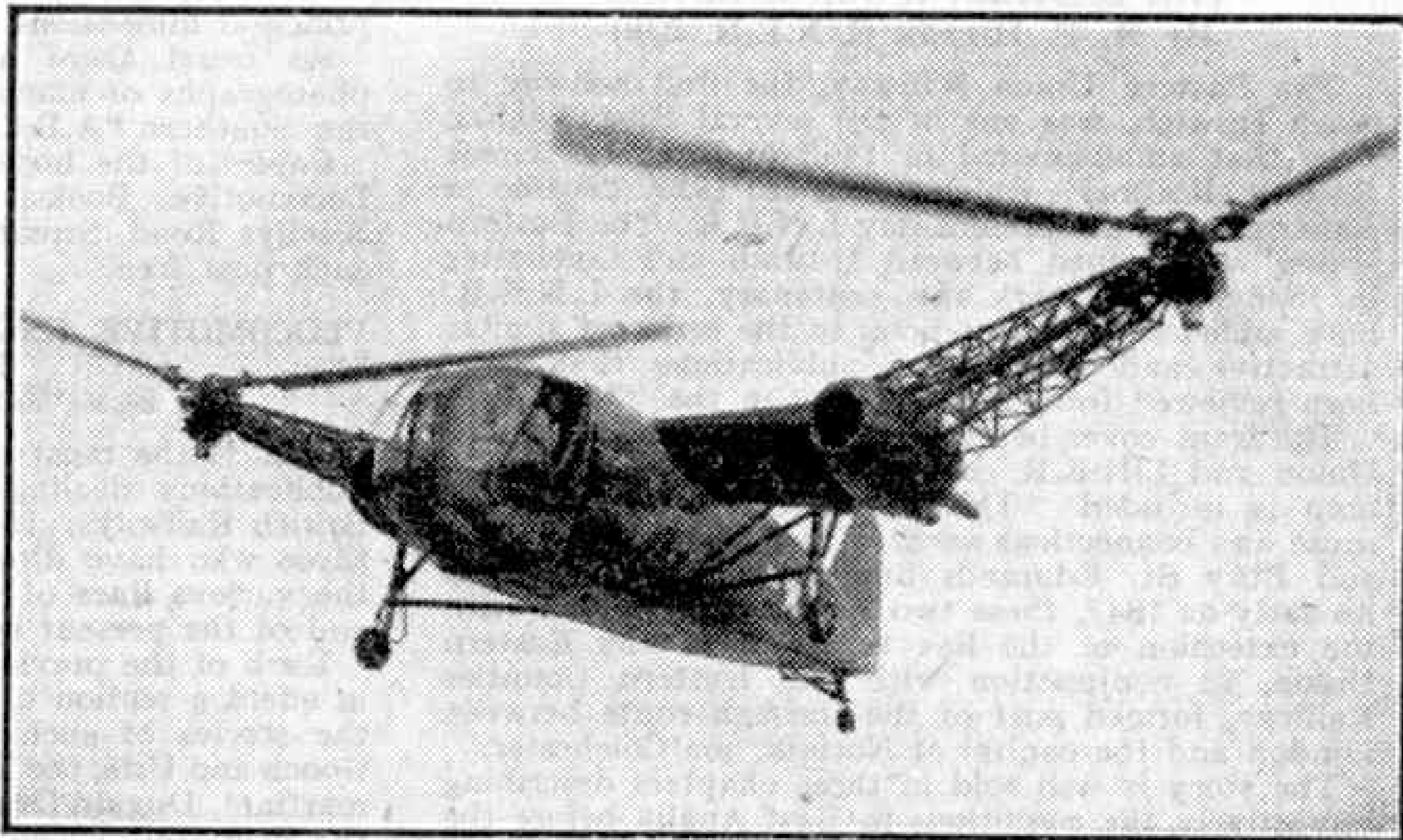
The XHJD-1 has a fairly orthodox fuselage with seats for a pilot and passenger in its Plexiglass nose. It has a fin but no tailplane, and a standard tailwheel type of undercarriage. The two 450 h.p. Pratt and Whitney "Wasp Junior" engines are carried on small stub wings at each side of the fuselage, and the rotors are mounted side-by-side outboard of these on girder-type pylons. They each have a dia. of 40 ft. and rotate in opposite directions, so dispensing with the need for a tail anti-torque rotor. The use of twin engines naturally gives this helicopter greater reliability, making it suitable for operating over rough country, built-up areas or stretches of water. Like most helicopters, should its power fail altogether, its rotors will continue to turn automatically, so that it can glide to earth in the same way as any fixed-wing aeroplane. But this is most unlikely, and a good feature of the XHJD-1 is that it can maintain height on either of its two engines, as either engine is able to drive both rotors through a system of over-running clutches.

Full details of the construction and performance of this new helicopter are not available, but it is known that it can cruise at more than 100 m.p.h. with a payload of over 3,000 lb., which is exceptionally good for a helicopter.

The Beechcraft "Bonanza"

In the past certain American aircraft companies have tended to be rather over-enthusiastic about their products, but Beechcraft are justified in being

enthusiastic over their new Model 35 "Bonanza," shown in the lower photograph on this page. In technical terms it is a 4-seat, all-metal low wing monoplane with retractable tricycle undercarriage and fitted with a Continental E-165 engine. Its revolutionary "butterfly" tail is not the machine's only outstanding feature, as on only 165 h.p. it will carry four 170 lb. people and 100 lb. of baggage for



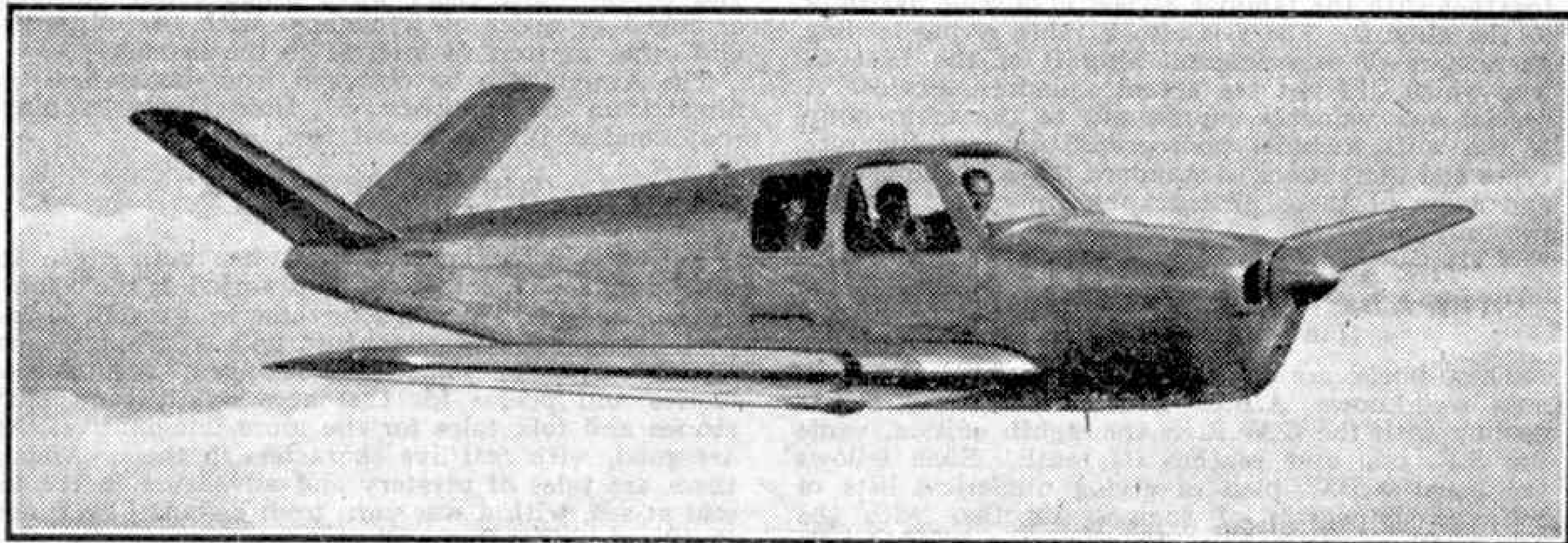
This strange aircraft is the McDonnell XHJD-1, the first American twin-engined helicopter. Photograph by courtesy of the McDonnell Aircraft Corporation, U.S.A.

700 miles at over 170 m.p.h. Beechcraft claim that if it is used for not less than 100 hrs. flying a month the cost per passenger is less than $\frac{1}{4}$ d. a mile. The machine has a wing span of 32 ft. 10 in., weighs 2,550 lb. fully loaded, and costs about £1,840.

Two completely different prototypes were built and were subjected to a rigorous programme of ground and flight testing before the final design was chosen. Since then three production machines have been flown day and night for more than 1,000 hrs. with excellent results.

The cabin is very roomy, and when the door is opened a footstep is automatically lowered. The machine can be controlled from either of the front seats. As for the "butterfly" tail, pilots who have flown the "Bonanza" say that they cannot tell the difference between it and normal tail controls. Its advantages include a saving in weight, cost and production time, a lower overall height for the machine, a clear view rearward, improvements in airflow qualities and reduction in drag.

The new Vickers V.C.2 air liner now being constructed is to be named "Viceroy."



A distinctive feature of the Beechcraft "Bonanza" 4-seat monoplane is the "butterfly" tail. Photograph by courtesy of Beech Aircraft Corporation, U.S.A.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"THE EASTERN UNION RAILWAY"

By H. F. HILTON (L.N.E.R. 2/6)

The Eastern Union Railway, the first railway to reach Ipswich, was one of the several East Anglian lines that amalgamated in 1862 to form the Great Eastern Railway, which itself in 1923 became a constituent of the present-day L.N.E.R. The Eastern Union was opened between Ipswich and Colchester in 1846 and to mark this centenary, the L.N.E.R. have added this present book to the series of similar attractive and informative publications that have been reviewed from time to time in the "M.M."

The front cover bears reproductions of the Eastern Union and L.N.E.R. coats of arms and, as usual, a map is included. This shows the Eastern Union route and connections such as the associated Ipswich and Bury St. Edmunds line, also opened in 1846. As early as 1847, these two systems united and with the extension of the line to Norwich, the Eastern Union, in conjunction with the Eastern Counties Railway, formed part of the through route between London and the capital of Norfolk, via Colchester.

The story is well told in three chapters describing respectively the conditions in East Anglia before the opening of the line, the progress of the railway scheme up to the Eastern Union opening and the subsequent development of the line. Entertaining accounts are given of the opening celebrations and early trips, with descriptions of the locomotives, some of which are illustrated by line drawings, engineering works, stations and other features of particular interest.

Copies of the book may be obtained from the Advertising Manager, L.N.E.R., 26, Pancras Road, London N.W.1.

"AIRCRAFT OF THE 1914-18 WAR"

By O. G. THETFORD and E. J. RIDING

(Harborough Publishing Co. Ltd. £1/11/6 net)

In terms of period this book prefaces the recently completed "Aircraft of the Fighting Powers" series of volumes dealing with military types in service during the recent war. The new volume does the same thing for Allied and enemy types of aircraft of the 1914-18 war, and includes practically every type of machine actually used in squadron service by the British, French and German flying services during that conflict. There are also four examples of Italian designs of that time.

The book is compiled on the same excellent lines as the 7-volume work already mentioned, with a detailed specification, operational history and one or more half-tone photographs of each machine, together with the familiar 3-view 1/72 scale drawings of the aircraft. There is also a table giving leading particulars of experimental aircraft of the 1914-18 war which did not see actual squadron service. A special and valuable supplement to the main body of the work includes photographs of over 100 rare types and derivations of standard types of the period, and some of these photographs are reproduced for the first time.

"THE A.B.C. OF G.W.R. LOCOMOTIVES"

"THE A.B.C. OF SOUTHERN LOCOMOTIVES"

(Ian Allan Ltd. 1/6 each)

These books are among the latest additions to the now well-known A.B.C. Locomotive Series. That dealing with the G.W.R. is the eighth edition, while the S.R. one now reaches its tenth. Each follows the usual A.B.C. plan of giving numerical lists of the various classes of engines, together with the names where these have been given. Brief details of dimensions are given under each class heading,

while there is in addition a separate table of principal dimensions.

As usual there are attractive reproductions of photographs of many of the engines dealt with, and the Southern "A.B.C." includes some line diagrams.

Copies of the books can be obtained from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 1/8½ each post free.

"LOCOMOTIVE ENGINEERS OF THE SOUTHERN RAILWAY"

By BEN WEBB (Ian Allan Ltd. 3/6)

This is the most recent of the series of "A.B.C." publications dealing with locomotive engineers of British Railways. It deals briefly with the careers of those who have directed the locomotive practice of the various lines of which the S.R. was constituted, and of the present system up to date.

Each of the previously independent railways forms in effect a section of the book, and in these we read the stories of such famous locomotive engineers as Gooch and Urie, the Beatties, Adams and that Scottish martinet, Dugald Drummond, of the former L.S.W.R., the Brighton "Chiefs" from Craven to Stroudley and his successors, and Wainwright and Maunsell on the eastern lines. Finally the career and practice of Mr. O. Bulleid are reviewed.

The engines of the periods covered are amply illustrated, and there are also reproductions of portraits of the men who designed them.

Copies of the book can be obtained from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16. Price 3/8½ post free.

"THE SHORT WAVE LISTENERS' ANNUAL 1947"

(Amalgamated Short Wave Press Ltd. 2/6)

It is astonishing to learn that there are to-day around 50,000 short wave wireless stations, a figure that does not include those maintained by amateurs. This gives some idea of the importance of short wave radio in modern life, and explains the need for an Annual such as this, which has been issued specially for the benefit of the listening section of the many who follow radio as a hobby. It contains a wealth of up-to-date information that will help the listener to understand how short wave radio works and to identify short wave stations in all parts of the world, and gives full information on the best means of reporting details of reception. There are also lists of commercial wireless telegraphy stations, and of the chief short wave broadcasting stations, arranged in order of frequency, with useful tables and other matters of interest to the listener.

The Annual can be obtained from booksellers, or direct from the publishers, 57, Maida Vale, Paddington, London W.9, 2/9 post free.

"THE RAINBOW BOOK"

(Harrap. 7/6 net)

This fine collection of stories has been given its name because its contents are as varied as the colours of the rainbow. There is something in it for all tastes, from lively tales of adventure and buried treasures for those who like "something to happen," to humorous stories and poems for the more sedate, and fairy stories and folk tales for the more imaginative. All are good, with real live characters in them. Among them are tales of mystery and adventure in the air and at sea, with a war yarn from distant China, and there are a few that will give readers a really good laugh. Each story is well illustrated.

"THE SMALLEST PUBLIC RAILWAY"

By O. J. MORRIS (Ian Allan Ltd. Price 2/6)

The 15 in. gauge Romney, Hythe and Dymchurch Railway, the "Smallest Public Railway in the World," is laid out and operated in a similar manner to a full size system, and all its plant and rolling stock have been designed and built for serious work. By no means the least of its attractions is found in its steam locomotive stock, for the engines are perfect small-scale reproductions that have to earn their



A train for Romney leaving Hythe Station, on the Romney, Hythe and Dymchurch Railway. This photograph by M. W. Earley is reproduced from "The World's Smallest Railway," reviewed on this page.

keep in running the services provided.

Mr. Morris writes about the line in a friendly and competent way, his book telling the story thoroughly and with due regard to the little details that appeal to the enthusiast. The original conception of the railway, route, permanent way and works and its stations occupy the first four chapters. Traffic working and rolling stock then receive attention, and the locomotives, as one might expect, have a chapter all to themselves. The war service rendered by this unique miniature railway, its armoured train, and the remarkable post war revival and re-opening last year bring the history to a conclusion.

The fascinating footplate fittings of a typical Romney engine receive special attention in the book, and there are a summary of past and present stock, an interesting table of locomotive dimensions and mileage details. The story finishes appropriately with a section on the personnel who run the system.

There are many attractive illustrations of typical scenes on the line, with plans of the layout at several stations. Copies of the book can be obtained from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 2/8½ post free.

"THUNDER ISLAND"

By WILLIAM S. STONE (Harrap. 6/- net)

Thunder Island is in the Pacific Ocean, although it does not appear on the charts under this name. Marahiti, a boy of 13, lives on the island, where he enjoys life with his sister Reri and their friends, swimming, fishing and rowing. Then along comes a terrible typhoon, which leaves behind it destruction on every side. Those living on the little island are compelled to take to their canoes, the risk of capsizing in the tempestuous seas being less terrible than the danger threatened on the island; and their adventures before returning to their homes form an exciting climax to an interesting native life story.

There are eight full page illustrations, most of them in colour, with drawings in the text.

"WHAT ENGINE IS THAT?"

By H. C. WEBSTER, B.Sc.

(Sampson Low, Marston & Co. Ltd. Price 10/6)

The purpose of this book is well indicated by the title. It is intended for the interested observer of railway engines and their work rather than for the technical expert, and in its pages there is a series of black-and-white side elevations of selected examples of British locomotives intended to assist in identifying any particular class or type. Various details

connected with the engines concerned are given, together with their principal dimensions.

Typical engines of each of the four British main lines are included, and there are also drawings of the W.D. 2-10-0 and 2-8-0 designs, some of which are now again at work in this country after service overseas.

The book is strongly bound in boards. It has an illustrated dust cover and should withstand the amount of handling it will undoubtedly get in the hands of

youthful enthusiasts making good use of it.

"THE BLACK PIRATE"

By JAMES CAHILL (Lutterworth Press. 4/6 net)

This is the story of a ferocious bandit who wreaked havoc among the remoter villages of China. We meet him and his gang first when Colin Wedderburn, the son of a missionary, and his friend Soo-chu are captured while fishing. Soo-chu is killed, and Colin is being tortured, when a landing party from a river gunboat arrives to his rescue. Unfortunately the party is not strong enough, with the result that they too are captured. In jubilation the pirates plunge into riotous feasting, after which they fall asleep, so that the captives are able to escape in the Black Pirate's own sampan. They get away, but only to return and to capture the entire gang. An exciting story of changing fortunes.

"MARINE MODELS"

(Hutchinson. 1/6 monthly)

The February issue of this well-known monthly is a special one dealing with the Shipwrights' Exhibition, held at the Royal Horticultural Halls, London, from 28th January to 8th February of this year. The Exhibition was arranged by the Worshipful Company of Shipwrights, which has a history stretching back over 700 years, during which time it has been in a special sense the guardian of the crafts of designing and building the merchant ships of war.

This issue of "Marine Models" gives a full programme of day-by-day films and lectures at the Exhibition, together with descriptions and illustrations of outstanding exhibits, especially the many model vessels of all kinds that were displayed. Among these we may note a scale model of the Union Castle Liner "Athlone Castle," a fine series of models of ships constructed by Vickers Armstrong Ltd., a miniature of "Empire Kitchener," representing Britain's wartime standard cargo liner, and two models from Admiral Lord Louis Mountbatten. A series of excellent articles on ship modelling, the sailing of model yachts and similar topics complete an interesting issue.

Model Making in Switzerland

By W. J. Bassett-Lowke, M.I.Loco.E., F.R.S.A.

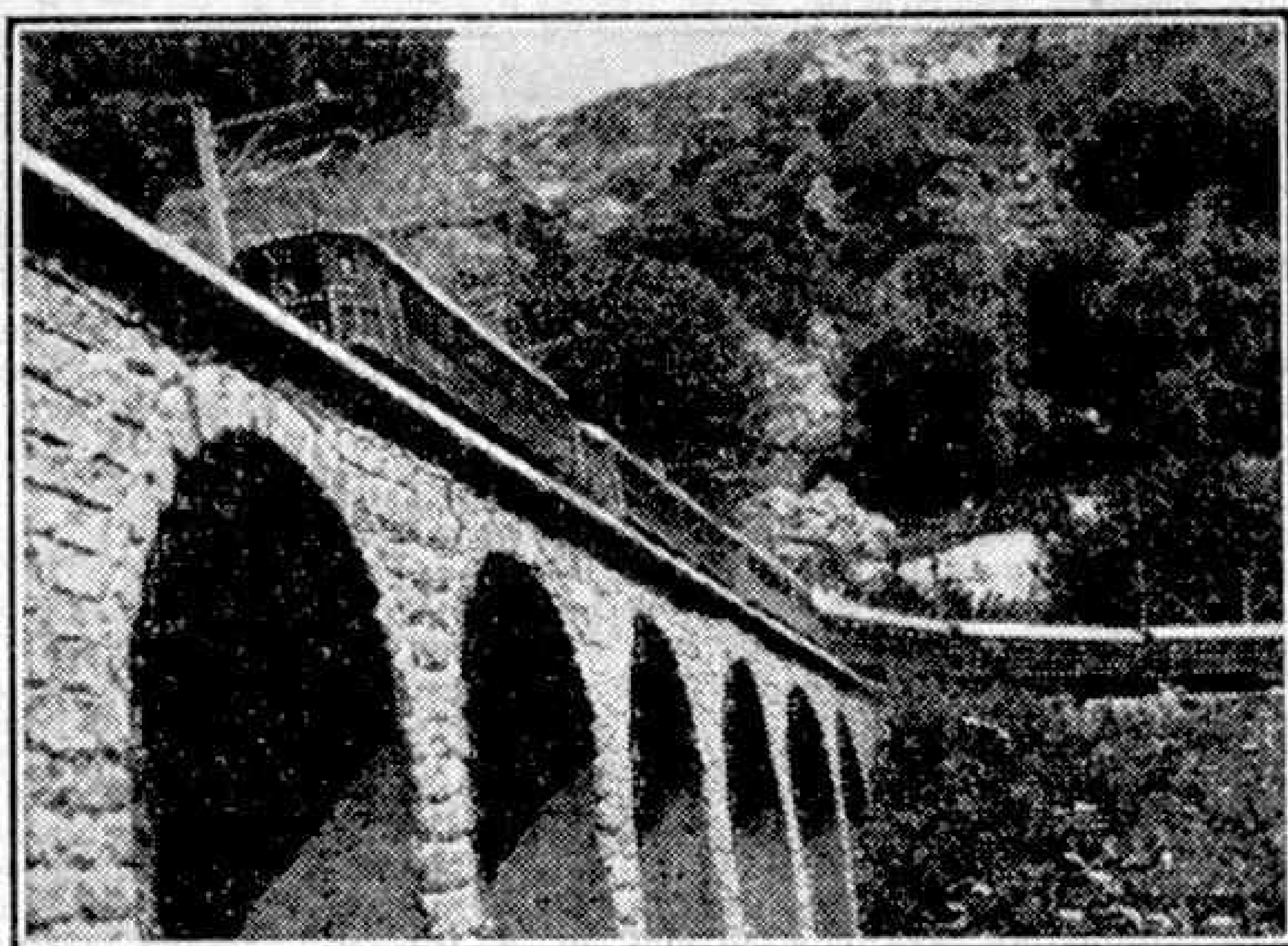
WHEN Switzerland is mentioned, most British people think of a land of beautiful scenery, winter sports, great summer holidays, charming people, good hotels and service, but I feel that they do not know the extent of the interest the ingenious and hardworking people of that country have in the very English hobby of model making.

Before the war I was a frequent visitor to Switzerland, and at their National Exhibition in 1939 I had the first real opportunity of seeing a display in various sections of the Exhibition of model work from all parts of the country. This covered the whole range of the model world—architectural, landscape, educational, museum and exhibition models, etc., by both professional and amateur. However, as most readers are more interested in the hobby rather than in the professional side of model making I must confine my remarks to the subject as a pastime.

As in this country, the hobby has led to the formation of a number of model clubs, and the four most important ones are the Schweizerischer Eisenbahn Amateur Klub (The Swiss Amateur Railway Club) of Zurich, usually referred to as S.E.A.K.; the Modellbau-Club, of Basle (The Model building Club); the Schweizerischer Modell-Eisenbahn Club, Berne (The Swiss Model Railway Club), and the Eisenbahn-und Modellbau Freunde, St. Gallen (The Railway and Model Builders Society). In Exhibitions and Conferences these clubs are often closely linked.

Like most business men, when visiting Switzerland I make my headquarters at Zurich, one of the commercial centres of the German part of the country. On arrival on my first post-war visit recently, my first pleasure was to call on Mr. M. Seigwart, President of S.E.A.K., who lives at Wettingen, near Zurich. He explained to me how the various clubs had progressed during the war period, and spoke of the very good work done by their members. He was then good enough to

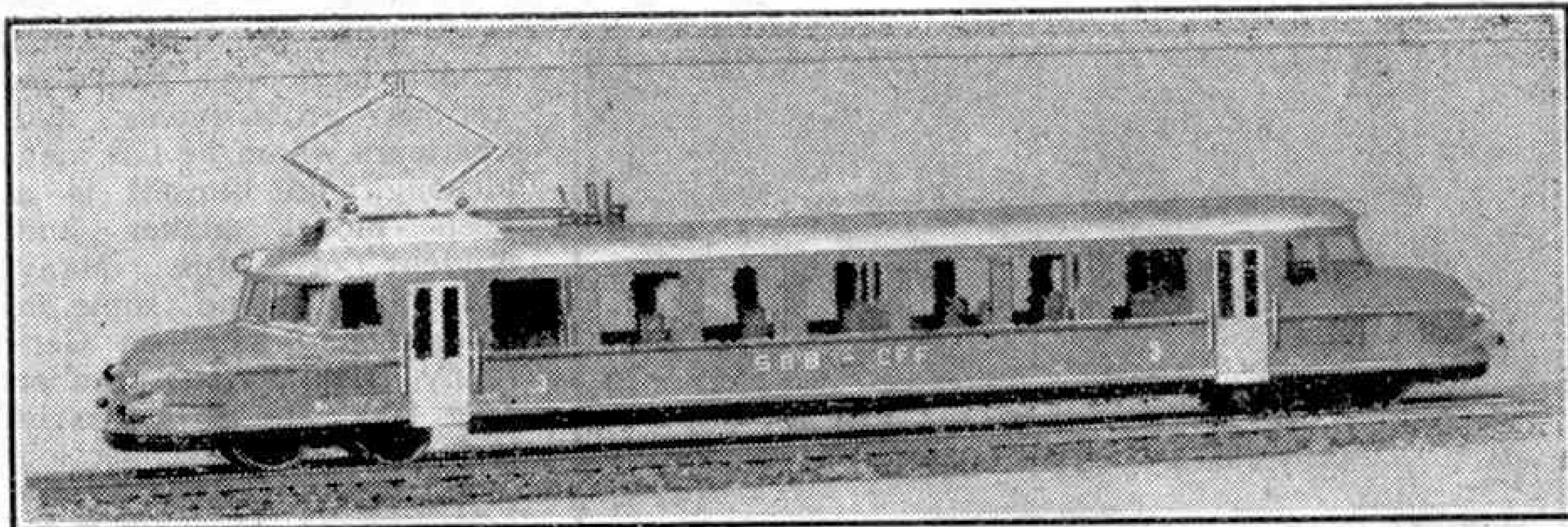
place himself at my disposal for a day, and with Mr. W. Gassman and Mr. H. Hurlimann, two other very keen enthusiasts of the hobby, I visited Lucerne to see the Brast Brothers, who are garage proprietors. These brothers have long been interested in large-scale steam locomotives and their first important effort in this direction was many years ago when they built a 4-4-0 L.M.S. "*George the Fifth*" from castings, parts, drawings and fittings supplied by Bassett-Lowke Ltd. This model was a great success and caused much interest in the Swiss Model Railway world, especially as steam



A miniature Lötschberg Railway electric train crossing a viaduct. This remarkable system is complete with all the characteristic features of the actual route and was built by Messrs. Seiler, Senior and Junior.

locomotives have disappeared from all the Swiss Federal Railways. In 1939 they had completed a model of the L.M.S. "*Royal Scot*," for which the castings were made by a young Swiss modelmaker, and this was followed during the war period by an early Swiss locomotive of the year 1870. All their locomotives are built to a scale of $1\frac{1}{2}$ in. on $7\frac{1}{4}$ in. gauge. They are now engaged upon an L.N.E.R. locomotive of the latest "*Pacific*" type, and in this instance they have obtained the official drawings from the L.N.E.R. and made their own model drawings, patterns, and castings. This model should be ready by the summer.

In addition to their ability and interest in the building of model steam locomotives,



The "Red Arrow" railcar model made by Mr. E. Klingelfuss, Wettingen. This is electrically operated on the overhead wire system.

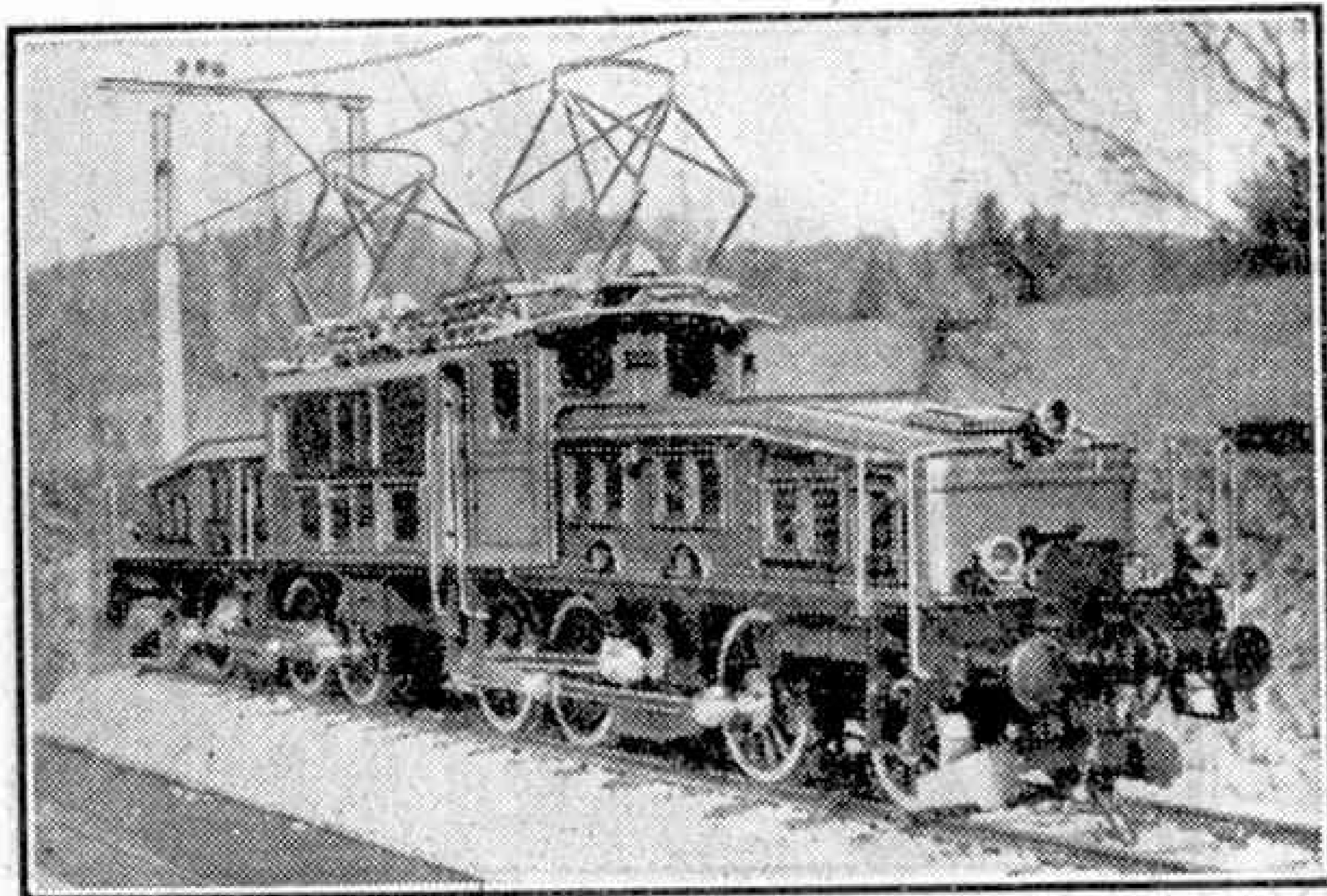
they have shown that they are also very enterprising people as they have opened to the public a model railway on a piece of land near the village of Horw, a few miles from Lucerne. Track of the ordinary Vignoles section on wooden sleepers has been laid, a station built, one or two overbridges, and other accessories provided, to make the layout attractive; and this has as great an appeal in Switzerland as similar railways have in England. On Sunday afternoons and all public holidays during the summer the railway is open to the public and it is a most popular rendezvous for young and old.

Farther round the shores of the Lake of Lucerne is the village of Hergiswil, where Mr. Karl Von Speyr lives with his English mother. In one of the large basement rooms Mr. Von Speyr has built a very well-equipped workshop and a large railway layout in Gauge 0. Connected to the main line is a narrow gauge mountain

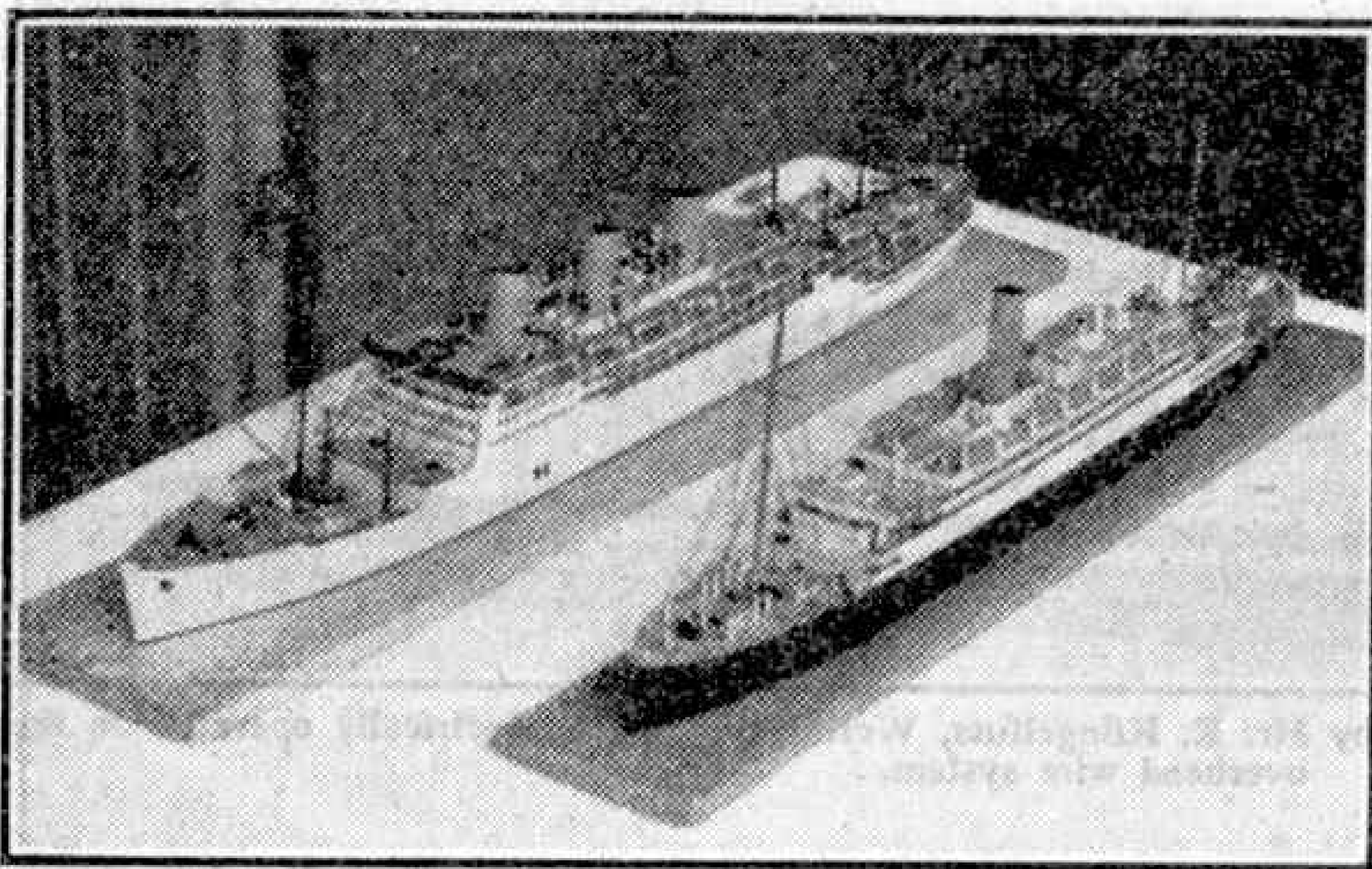
railway of the same scale. He has been personally responsible for the building of the electric locomotives, the track, the buildings and the remainder of the equipment. Apart from being an enthusiastic model maker and model railway operator in this small gauge, he also finds steam models of great fascination, and in his spare moments when the $7\frac{1}{4}$ in. gauge railway is open at Horw he is a frequent volunteer driver on the line of the Brast Brothers.

No reference to Swiss model making could omit mention of the famous model of the Lötschberg Railway. This model was specially made for the "Landesausstellung" 1939 (the National Exhibition of Switzerland). Built by Messrs. Seiler, Senior and Junior, it was a reconstruction in Gauge 0 of this well-known mountain railway, and all the characteristic scenic features, which include waterfalls, gradients, bridges, rivers, etc., were re-

produced as accurately as possible within the range of the small scale. It was built in the open air for the 1939 exhibition and proved to be a great attraction. The present-day interest of this model is that it has been rebuilt and transferred to the garden of the home of the builders at Rietholzstrasse 4, Zollikerberg. A few technical details may interest readers. The length of the track is nearly 700 ft.; some of the gradients are 32 degrees; the total height from the lowest to the highest portion of the track is nearly 6 ft.; 365 poles carry the overhead wires, and there are



A powerful Swiss Federal goods locomotive type is reproduced in this model. It has four electric motors and took its builder, Mr. F. Zumbach, three years to construct.



Two wonderful ship models from the collection of Mr. P. Keller. The vessels represent respectively the P. and O. Liner "Strathnaver" and the Royal Mail Lines cruising ship "Atlantis."

over 700 trees in the magnificent layout. The rolling stock consists of two electric locomotives, two motor coaches, and a full range of passenger coaches and goods vehicles of every description.

One of the members of the S.E.A.K. who is much admired for the neatness and finish of his work has recently completed a model of the famous motor coach known as the "Red Arrow." This model, built to scale for $1\frac{1}{4}$ in. gauge, has a length of 478 mm. It is driven by one electric motor of 20 volts A.C. and supply is provided by overhead conductor wire. This typical example of the skill of the model maker was built by Mr. E. Klingelfuss of Wettingen.

Another important model made by a member of the Zurich Club, Mr. F. Zumbach of Zweidlen, is a 1:30 reproduction of a very powerful electric goods locomotive of the Swiss Federal Railways. This locomotive is for $1\frac{3}{4}$ in. gauge, has a length of 666 mm., and is driven by four powerful motors of 30 volts, worked either with D.C. or A.C. The model took over three years to construct and is outstanding in many respects, being greatly admired wherever it has been exhibited.

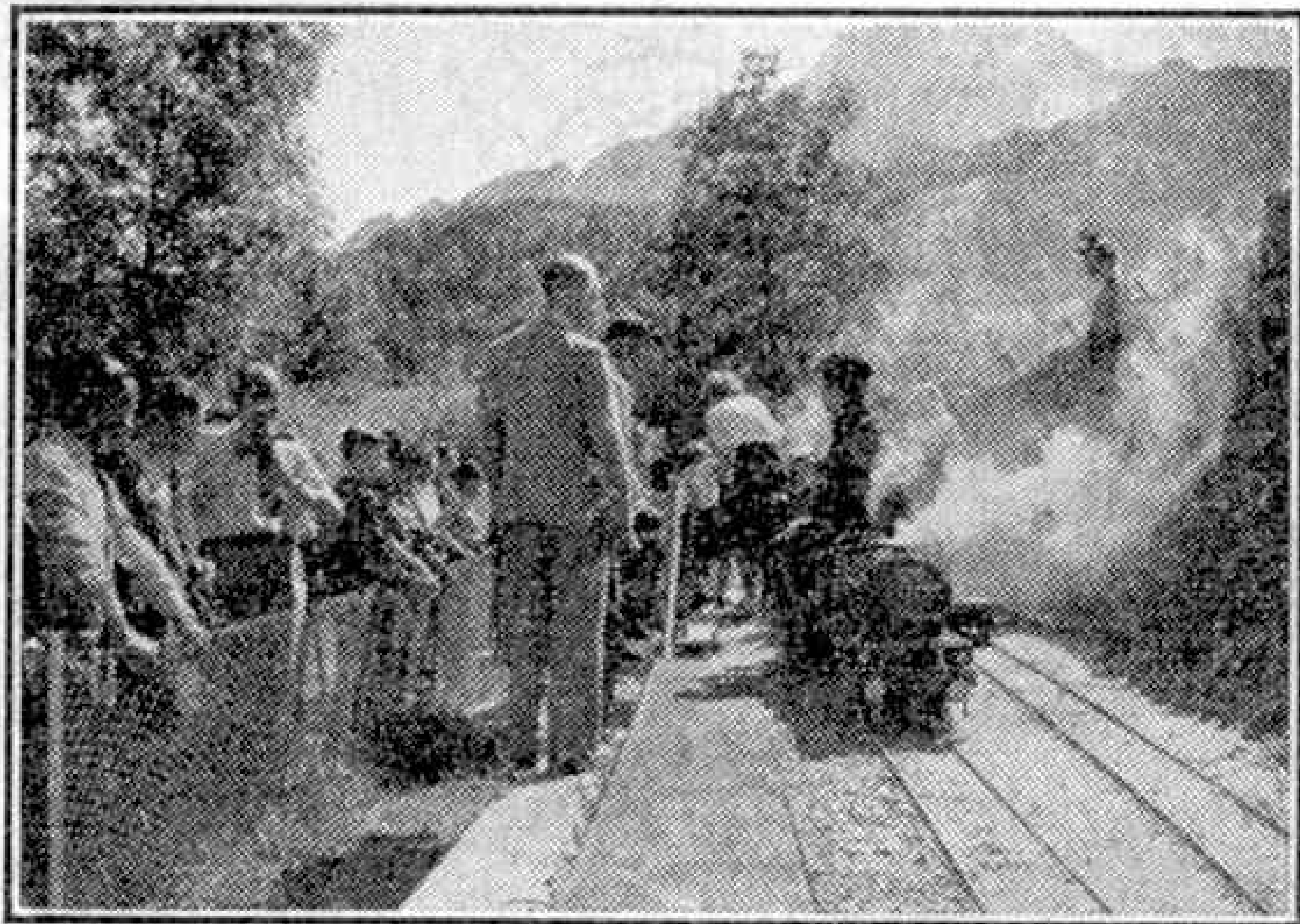
Every visitor to Switzerland who is interested in model ships should try to visit Mr. P. Keller at his lovely home, Kraemerstein, St. Niklausen, Lucerne. For many years Mr. Keller has been a collector of very fine waterline and full hull models of every type of ship of all nationalities. All built to the

same scale, the bulk of his models have been made by various professionals and amateurs whom he has met, although he himself is a keen model maker and student of ships. Many made in England, some in France, and some in Germany, his models number over 200. He is justifiably proud of his unique collection and is very pleased, by appointment, to show it to anyone who is visiting Switzerland who is interested in this type of model.

Next year marks the centenary of the Swiss Railways and this event is to be celebrated by many interesting functions in that country. The most important of these is the Swiss Railway Centenary Exhibition, which is to travel round the country from 5th April—30th November, staying at the various cities and towns.

The actual opening day of the "Spanisch Brotlibahn," the first railway to run entirely on Swiss ground, was on 9th August 1847, and on 9th August 1947 a full-sized reconstruction of the first train will run from Baden to Zurich, while the same train will be in service at those cities at which the exhibition is to be installed. The nickname of "Spanisch Brotlibahn" has been given to this first railway because of the purpose which it first served. "Spanisch Brotli," at the time of the opening of the railway, were a speciality of the

(Continued on page 142)



Steam! A typical scene on the passenger-carrying railway at Horw, near Lucerne, operated by the Brast Brothers. The engine is a $7\frac{1}{4}$ in. gauge "Royal Scot."

Have You Ever Thought About This?

Why are some Engines fitted with Smoke-box Wings?

By "Shed Superintendent"

WHEN engines began to be designed with very high-pitched boilers, thus reducing the height of chimney permissible under the loading gauge restrictions to a matter of a few inches, trouble occurred owing to steam and smoke beating down in front of the cab windows, obscuring the driver's view of the line ahead.

Certain classes of engine were particularly troublesome. As is usual in mechanical matters, more than one factor was involved. The height of the chimney was the primary but not the only cause. The exhaust pressure of the steam, the blast pipe arrangements and the general proportions of the engine all had something to do with it. Certain routes, too, were concerned, owing to the prevailing winds, which in this country are south westerly. Thus on the Western Section of the Southern Railway the down trains normally run against a head wind which blows the steam down over the engine, and the Southern Railway was one of the first to conduct research into the problem.

Early experiments were concentrated on the chimney itself. Air scoops were fitted at the side of the chimney; chutes were built into the smoke-box to bring a current of air out behind the chimney, and double-chimney devices were tried, but all with little or no cure as the result. It became clear that in order to lift the large volume of expanding steam that comes out of the chimney, it would be necessary to produce a correspondingly large volume of updraught to carry the steam up over the engine. Hence experiments came to be made with "wings" or deflector-plates as they are known. These proved much more effective. Provided that these were fitted well in front of the chimney it was found that they would collect a considerable volume of air. They also had to be spaced well apart, wider than the diameter of the boiler, to ensure that the width of the air-current so induced would be adequate to surround the mass of expanding steam. Trial designs had the "wings" set well out from the smoke-box, at the maximum spacing permitted by the overall width of the engine framing. Subsequently it was found that, provided the wings were

set out beyond the smoke-box diameter by a few inches, the desired effect was obtained and no good purpose was served by having them any wider. Thus the wings on the trial engines looked very ungainly, but the appearance of the final designs left little to be desired, as admirers of the "Lord Nelson" and the original "Royal Scot" classes will agree. The striking cover to this issue shows the disposition of the wings or deflector plates on the Southern Railway "Schools" class locomotive.

Incidentally, these practical trials were confirmed by wind-tunnel tests on models, powdered chalk being used to reproduce the steam from the chimney. Small wings were tried in various positions on the models. One pattern consisted of long wings the whole length of the engine, another was an arrangement of curved wings on the smoke-box door, but the best results were secured with the side wings previously described.

It will be noted that, by fitting a tapered boiler, there is room for a chimney of reasonable height, and the L.M.S. and G.W.R. tapered-boiler designs do not suffer from steam drifting downwards. The S.R. tapered-boiler designs were fitted with deflector plates more as a precaution than as a necessity.

The problem is still under active investigation, particularly in connection with streamlined engines, on which it is difficult to fit deflector plates of the conventional pattern. The L.N.E.R. Gresley "Pacific," in streamlined form, has a wedged-shaped front-edge and a chimney well clear of the boiler top, with effective results. On the other hand the S.R. Bulleid "Pacific" having a chimney flush with the boiler top has undergone various modifications to the front-end since the first 1941 design, and all the "Merchant Navy" and "West Country" engines have small deflector plates. More recently, numbers 21C.11 to 21C.20 have been fitted with larger plates indicating that further experiments are being made. On the L.M.S. several "Pacifics" have had the streamline casing removed and smoke-deflectors fitted; and No. 6234, built without streamlining, has also been equipped with deflectors.

Liverpool Cathedral Bells

The Greatest Peal in the World

By Ernest Morris, F.R.Hist.S.

LIVERPOOL Cathedral, the third to be built in England since the Reformation, will when completed be the largest in the country, and among the cathedrals of the world it will be inferior in point of size only to those of St. Peter's, Rome, and Seville. Its great central tower will have a height of 357 ft. above St. James' Road, and will house the largest swinging ring of bells in the world. This consists of 13 bells which were provided by a bequest of the late Thomas Bartlett, a Liverpool merchant who died in 1912, and the gift is recorded on the great tenor bell.

The tower is being erected by the generosity of Lord Vestey and his brother Sir Edmund Vestey, who also have provided a great "Bourdon" bell, the second largest bell in England. These

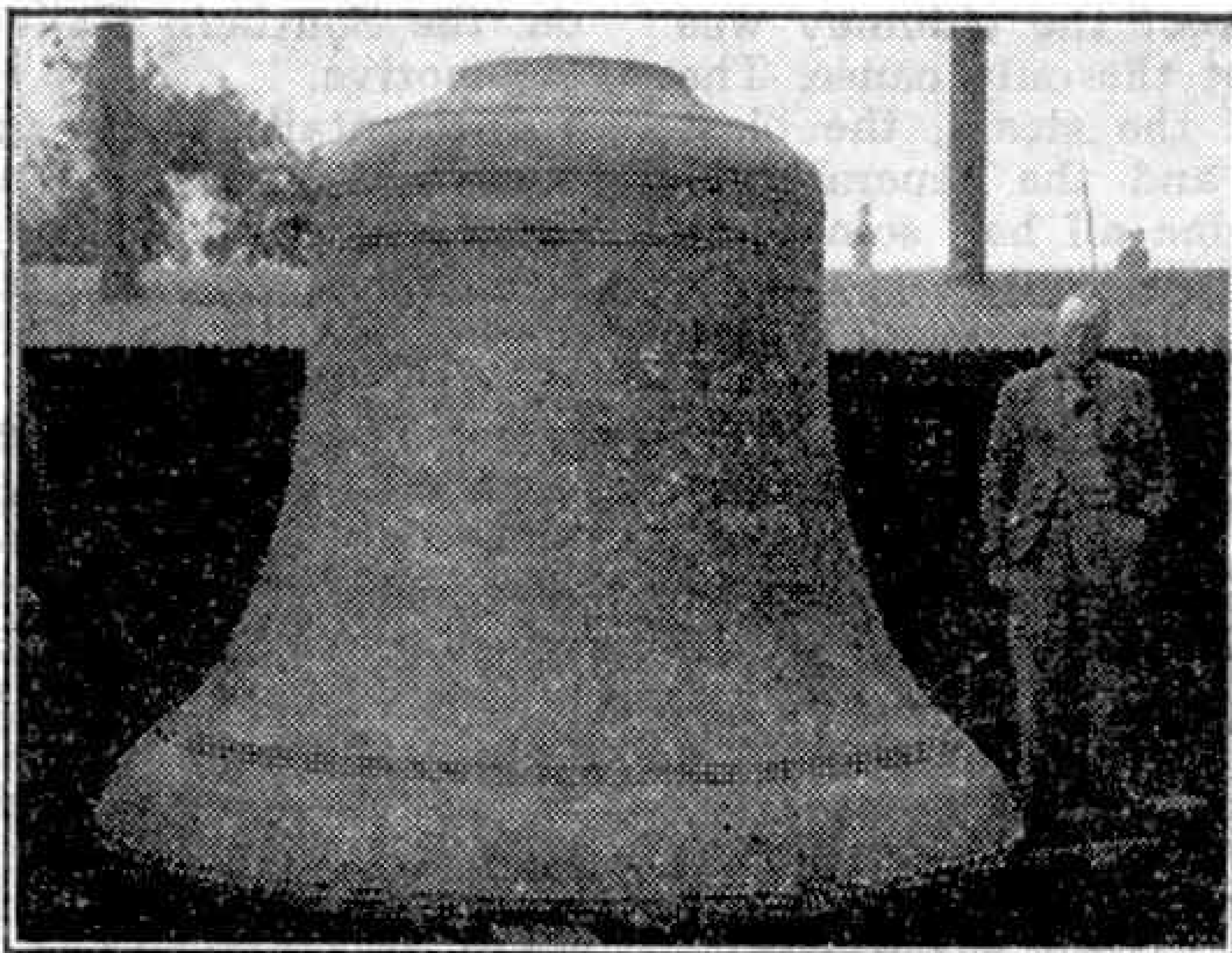
great bells are to hang in a special frame, for such a great weight of swinging metal requires a structure of enormous strength, on account of the heavy horizontal and vertical forces that will be exerted when the bells are rung.

The design and construction of a suitable frame to carry the bells presented a problem, partly on account of the unusual span of the tower, and partly because of the location. Iron and steel were not considered suitable, because of the effects of corrosion and the frequent painting that would be necessary. Timber was rejected because of the difficulty in obtaining the large sections sufficiently seasoned. It was finally decided to use reinforced concrete, an entirely new departure, and as ample space was available, to adopt a radial frame in which each of the 13 bells swings to the centre. This not only

successfully distributes the horizontal forces, but has the added advantage of allowing the ropes to fall plumb from the wheels to the ringing chamber below in a perfect circle of minimum diameter.

The reinforced concrete staunchions on which the bells will be carried will form part of one enormous unit extending across the high tower, and built up from the floor of the ringing chamber. These

staunchions are to be 7 ft. in height and will vary in thickness according to the weight of the individual bells they have to carry, from 6 in. for the treble to 12 in. for the tenors. They gain lateral support from "tails," which run back 10 ft. from the full height of the staunchions. Each in fact is a solid wedge carrying the thrust from the



"Great George," the Bourdon Bell of Liverpool Cathedral, which weighs 14½ tons. The illustrations to this article are reproduced by courtesy of Messrs. Mears and Steinbank, Whitechapel.

bearings to floor, as the accompanying illustration of the model of the entire frame shows.

Concrete has poor acoustic qualities, which would detract from the effect of the sound in the ringing room. In order to overcome this difficulty the foundation of the frame is to be placed on an insulating material, and the ringing space of the floor below is to be enclosed by wood partitions, making a spacious apartment.

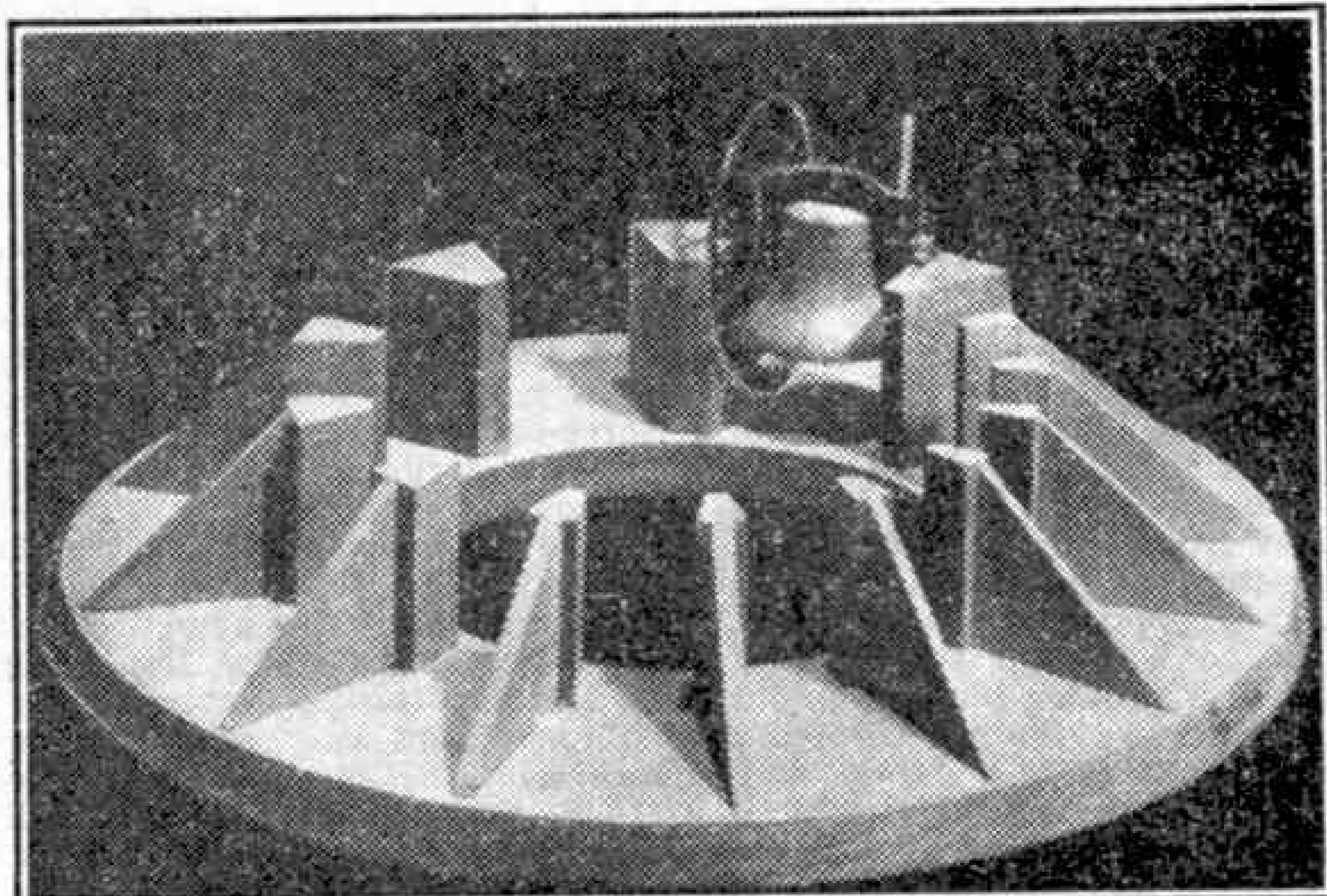
In the space in the centre of the radial frame the great Bourdon bell is to be placed. It was cast at Loughborough and weighs 14½ tons, being the second largest bell in this country. The weight of "Great Paul" of St. Paul's Cathedral is 16½ tons, while "Big Ben" of Westminster, so often heard by radio, weighs 13½ tons.

This great bell has a diameter of 9 ft. 6 in. and is inscribed:

"Make a joyful noise unto the
Lord all ye lands.
To the Glory of God
in thankfulness for great
mercies
received and in affectionate
remembrance of the City of
Liverpool
William Baron Vestey of
Kingswood
and his wife Evelyn
with
Sir Edmund Hoyle Vestey
Baronet
and his wife Ellen
gave me in the year
1937
and in memory of
King George V
named me
GREAT GEORGE"

The great "Bartlett" peal of 13 bells has a tenor bell weighing 4 tons 2 qrs. 11 lbs. Each of the individual bells has an appropriate name, the full list being 1, "Bede"; 2, "David"; 3, "Paul"; 4, "Chad"; 5, "Gilbert"; 6, "Guthlac"; 7, "Michael"; 8, "Nicholas"; 9, "Martin"; 10, "Peter"; 11, "Oswald"; 12, "James"; and 13, "Emmanuel." There are of course, heavier bells in other parts of the world, but these for the most part are hung "dead" and do not swing in full peal like English bells.

The great tenor was cast on 9th Decem-

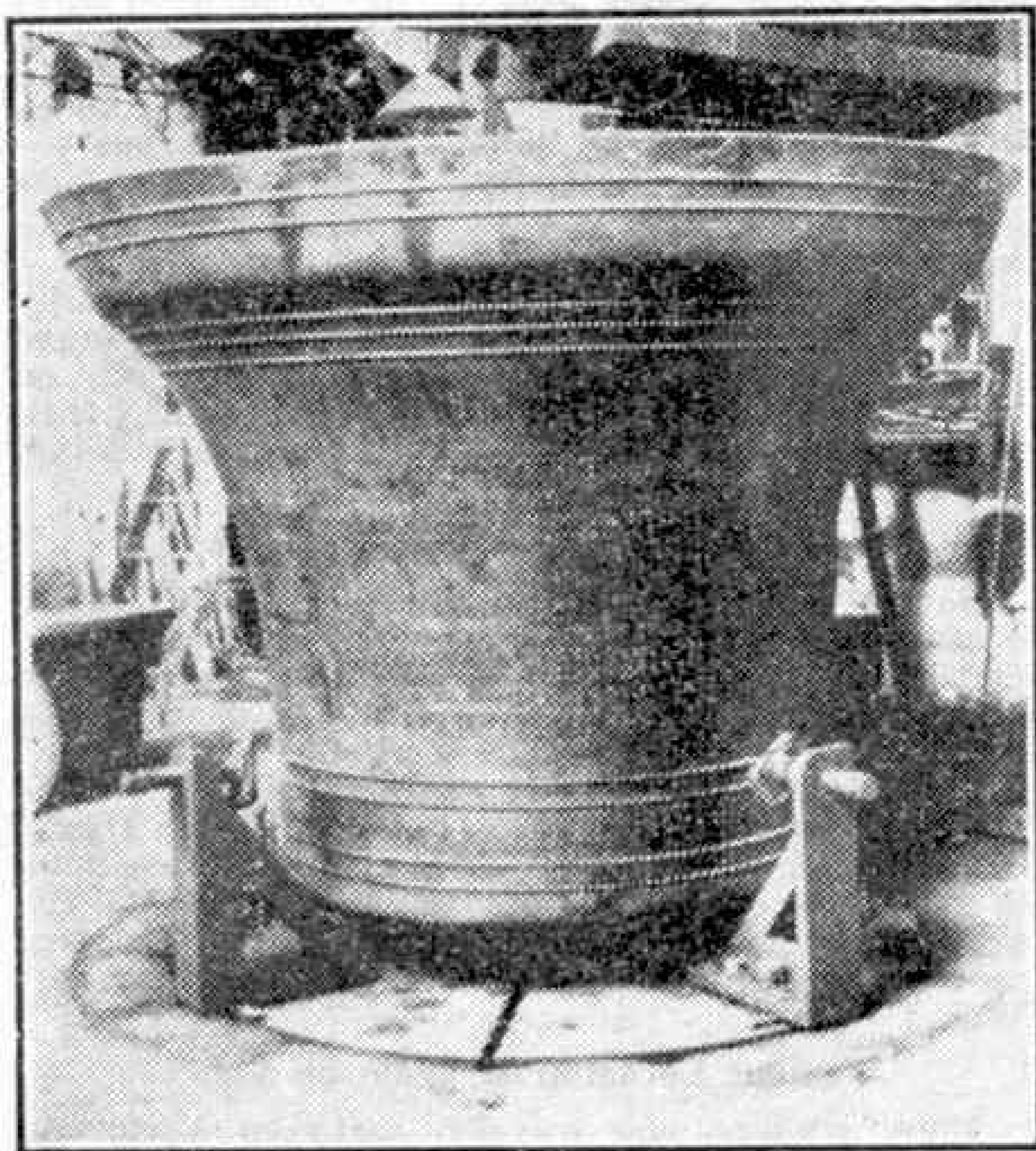


Model of the concrete frame that will carry Liverpool Cathedral's great ring of 13 bells.

ber 1938 in the presence of the Ven. Archdeacon G. J. Howson, Sir Giles Gilbert Scott, the architect of the Cathedral, Col. V. Cotton and other members of the Cathedral committee. The furnace, into which some 5 tons of metal were placed, was lighted at midnight. Just after noon, ingots of Cornish tin having been added to the molten copper, the crucible was tapped and a steady stream of metal like liquid gold flowed for nearly 10 min. through the channel that led it to the mouth of the mould buried in the earth. Then as it bubbled from the top, the stream was diverted to another channel prepared to receive the surplus alloy. This interesting operation was entirely successful and a perfect bell was cast.

One cannot speak of Liverpool Cathedral bells without a reference to those of St. Peter's Church, which was the pro-cathedral of the Liverpool diocese until its demolition. The church was consecrated in 1704, and in 1707 four bells were cast for it by Abraham Rudhall of Gloucester. In 1724 these were increased to eight, and this octave remained in use until 1830, when it was dispersed. Two of the 1707 bells are now at St. Augustine's Church, Everton, and St. John's, Knotty Ash, West Derby, while a third went to St. Catherine's, Abercromby Square, Liverpool. One of the 1724 bells found its way to the church of St. John, now destroyed.

On the dispersal of the old bells, a new ring of 10 bells was erected, having a tenor of 24½ cwt. When St. Peter's Church was taken down, these bells were sent to a Liverpool church and eventually were transferred to one at St. Helens.



The tenor bell of Liverpool Cathedral on the tuning machine. Its diameter is 6 ft. 4 in.

Railway Notes

The "Yorkshire Pullman"

The "Yorkshire Pullman" is the first luxury limited express to resume running on the East Coast route since the war. The main section of six cars serves Harrogate, Leeds and Wakefield; a three-car portion from Hull and Goole is attached at Doncaster, forming a nine-car train running without a halt over the 156 miles from Doncaster to King's Cross, the longest non-stop run on the L.N.E.R. today. After a short stay in London the train returns northward at 3.50 p.m. on a similar schedule. This new accelerated service is proving highly popular. The first and third class cars are newly decorated and equipped, and as on the S.R. "Golden Arrow" and "Bournemouth Belle" Pullman expresses, reintroduced in 1946, there is a public address system, for making announcements to passengers by means of loud-speakers concealed in the car roofs.

Between Leeds and London, green "Pacific" engines haul this express. Up to the time of writing, No. 97 "Humorist" has been on continuously since 4th November; with Kylchap blast pipe and double chimney she is usually a grand performer. Alternating with No. 97, "Royal Lancer," "Felstead" and "A2" class "Edward Thompson," respectively numbered 107, 89 and 500, have been seen working in the opposite direction, down one day and up the next. They are King's Cross engines, but are handled by keen Leeds (Copley Hill) crews, who make every endeavour to recover lost time when necessary, so reviving the long traditions of fast and enterprising running created first with the famous Ivatt "Atlantics" on L.N.E.R. "Pullman" expresses. A "Hunt" 4-4-0 is often on the Harrogate portion north of Leeds, where reversal is needed, while one of the new "B1" 4-6-0s is used on the Hull portion as far as Doncaster.

Brief details of an excellent run from Doncaster to London by "Royal Lancer" follow. Owing to a delay on the Hull line, the well-filled combined train weighing about 385 tons left Doncaster at 12.3, five min. late, yet by the time Grantham was passed all of this had been recovered. The first 50½ miles were covered in 52½ min. Then, after a swift though steady descent of the well-known Stoke bank, came an extremely cautious passage of the station and yards at Peterborough. Now the "Pullman" was just ahead of time, but excellent running was to come. The 41½ miles from Huntingdon to Hatfield, including a good deal of adverse grading, occupied only 39 min., with 70-80 m.p.h. touched in places. An average of almost 60 m.p.h. had been maintained for more than 120 miles when Hatfield was passed at 2.24½, 5½ min. early. No special slowings for track repairs were necessary that day, though there have been many since, and so far every signal had been "off," but before Potter's Bar, also outside King's Cross, adverse

signals caused a reduction of speed almost to a crawl. Nevertheless the arrival at King's Cross at 2.48 p.m. was two min. before time; the engine was seven min. to the good without allowing 3½ min. for the signal delays, so that the net time for 156 miles was no more than 161½ min. This gave the equal of a 58 m.p.h. average, including the long slowing through Peterborough, an excellent performance. When conditions become normal the daily timing each way will probably be accelerated to the mile-a-minute rate applying in 1939.

These notes are contributed by Mr. R. A. H. Weight.

Great Western News

Construction of the "County" 2-cyl. 4-6-0 class was resumed at Swindon last autumn. Nos. 1020-2, named respectively "County of Monmouth," "County of Montgomery" and "County of Northampton," came into service round about Christmas. New 0-6-0 pannier tanks numbered 9660-1 were placed in service.

Three more "Austerity" 2-8-0s numbered 70876, 77326 and 79309 were received on loan from the Government, while four of the G.W. built "8F" 2-8-0s, numbered 8401/5/7 and 8415, were handed to the L.M.S.

Among the engines withdrawn was 4-4-0 "Bulldog" No. 3353 "Perschore Plum," of Worcester. More "Castles" converted to oil burning are No. 5039 "Rhuddlan Castle" and No. 5083 "Bath Abbey." Names have been given to further "Halls" as follows: No. 6917 "Oldlands," No. 6922 "Burton," No. 6929 "Whorlton," No. 6933 "Birtles" and 6959 "Peatling;" in each case "Hall" is included in the name. No. 6959 is the first of the modified series lately constructed. Ex-Taff Vale 0-6-2T No. 300 has been renumbered 200.

The company's 1947 programme pro-

vides for 110 new locomotives.

Owing to the normal track being temporarily blocked, certain G.W.R. main line trains were worked into Marylebone recently, while for a period, on account of a landslip near Willesden Green, an L.N.E.R. train hauled by an "A5" 4-6-2T started from Paddington for Brackley.

L.M.S. Locomotive Developments

Several of the new light weight 2-6-0s and 2-6-2T engines have been observed on main line empty carriage or other workings in the neighbourhood of Willesden and Kentish Town, as well as on other parts of the system. The latest rebuilt "Royal Scots" are No. 6118, "Royal Welch Fusilier," No. 6139 "The Welch Regiment," and No. 6161 "The King's Own." The streamlined casing has been removed from more of the "Princess Coronation" or "City" 4-6-2s. The latest style of black paint, lined out, is seen on locomotives of various types that have recently left Works.

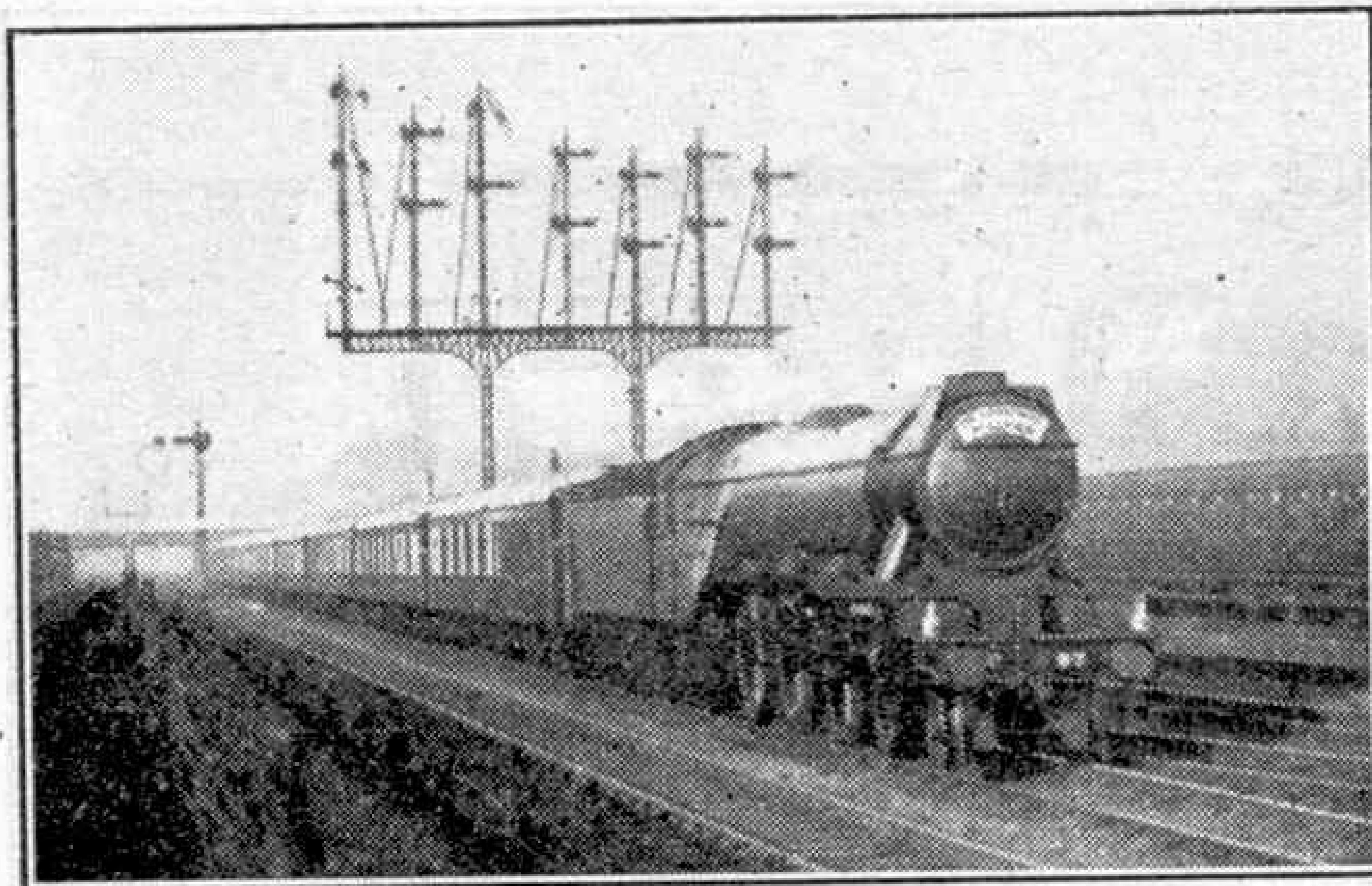
Famous Locomotives again on View

Many readers who travelled between York and Newcastle, or changed at Darlington, years ago will remember the veteran Stockton and Darlington locomotives "Locomotion No. 1" of 1825 and "Derwent," a six-wheeled engine of 1845. These were



Down L.M.S. express passing Berkhamsted, hauled by "6P" re-boilered 4-6-0 No. 5736.

Photograph by H. C. Casserley.



L.N.E.R. "Yorkshire Pullman" passing Finsbury Park, hauled by "A3" No. 97 "Humorist." Photograph by K. A. C. R. Nunn.

exhibited on plinths at Darlington station following actual running in the Railway Centenary procession from Stockton to Darlington in 1925. With other famous historic locomotives from York Museum they were removed for security reasons in 1941 and carefully stored in country sheds, but they have now been cleaned up and restored to their exhibition stands on Darlington station, near the site of the terminus of the world's first public railway, on which they worked.

Electric Operating News

By 12.45 a.m., soon after the midnight cessation of traffic, the current is switched off the conductor rails throughout London Transport railway system. At about 4.45 a.m. it is switched on again, as trains are soon to begin their long day's running, once more conveying millions of passengers. In the four hour interval at night the immense amount of engineering or inspection work, largely in tunnel, necessary to ensure safety has to be concentrated. Tracks are renewed when necessary by expert gangs with mechanised equipment. New rails are welded into 300-ft. lengths for better and quieter riding.

Out in the open, especially in more exposed parts of the country, precautions have to be taken in winter against the formation of ice or accumulation of snow on conductor rails. Frozen water is not a conductor of electricity and can seriously interfere with the running. The S.R. have fitted up a number of coaches with oil spray apparatus, and these vehicles are ordered out by the Controllers when necessary. They can be attached to a spare electric train or hauled by a locomotive. Low grade non-freezing oil sprayed along the head of the conductor rails causes any frozen deposit to form a "soft mush," which can be removed by the collector shoes of the trains, or by means of steel scrapers, worked by compressed air, also attached to certain coaches of electric train sets. Experiments are being

made with chemical fluids that melt ice already formed.

Improvements at New Street, Birmingham

New Street, that large, busy and rather grimy old station in the heart of Birmingham, is having a modern roof of the "umbrella" type fitted instead of the high, arched single-span glazed roof that in sections covered what prior to 1923 were two separate stations side by side, one owned by the Midland and the other by the London and North Western Railway. Several of the island platform faces as well as bay platforms have now been given separate distinctive numbers, resulting in much clearer directions to passengers by printed indicator or loudspeaker announcement as to where trains will arrive or depart, as there are through services from New Street in many

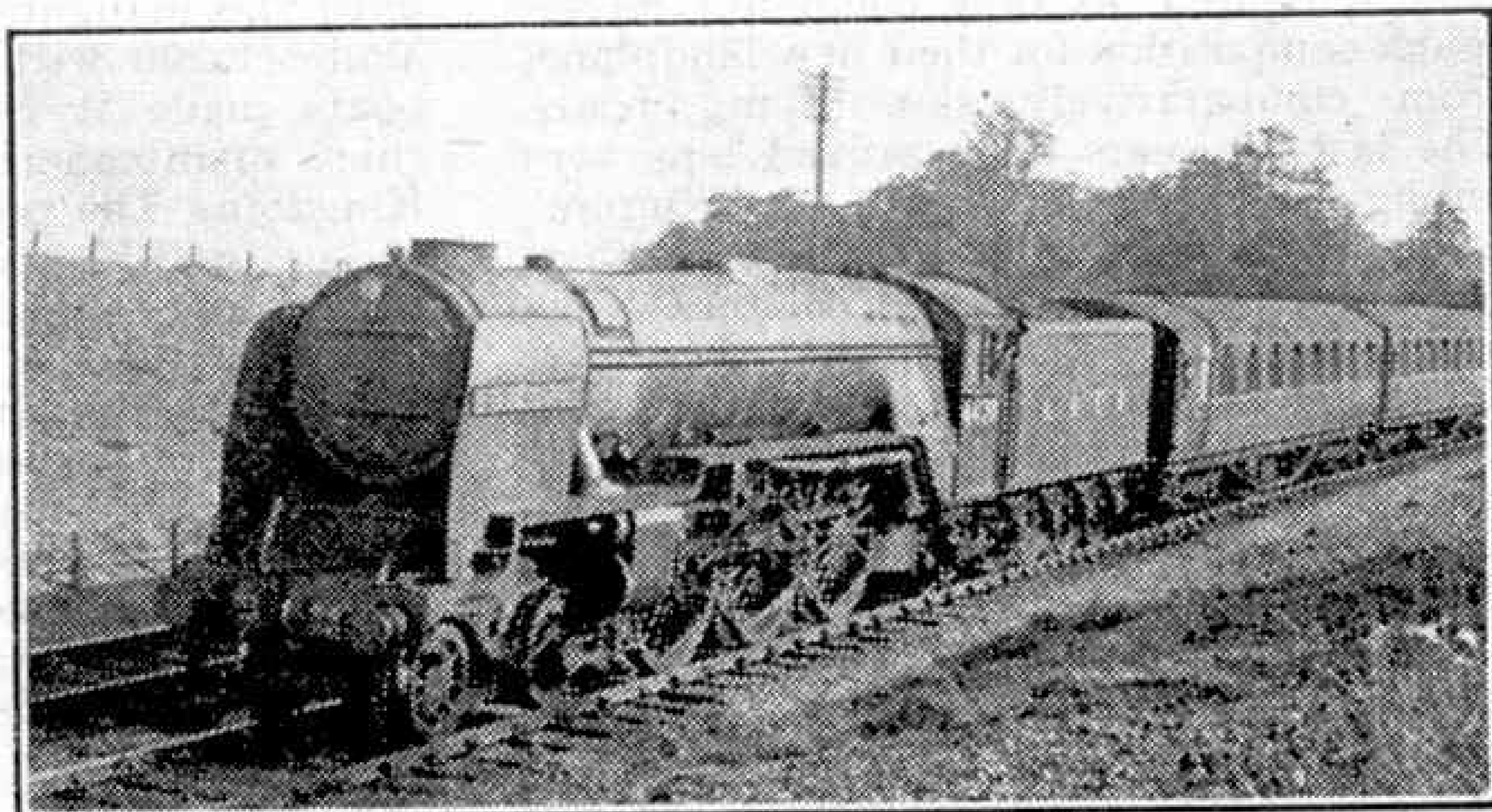
directions.

New Southern Passenger Coaches

In October last the public were asked to visit and comment upon a specimen new corridor coach exhibited at London termini. Many suggestions were made as to interior equipment and furnishing, as a result of some of which the style was decided for the three-coach corridor sets now running in the "Atlantic Coast" or other Western Division express services.

More passengers voted for compartment than open type stock, so both tastes are catered for. At each end is a third brake coach with guard's and luggage accommodation. There are two compartments seating eight each, and a gangway with entrance doors leads also to the "open" section, which comprises 32 seats, four on each side of a centre gangway. The middle vehicle of each set is a first and third class composite, all accommodation being in compartments. There is a central entrance door as well as those at the ends.

The lighting is good, large windows provide wide observation, and lavatories and corridors are heated. Extra width is provided, as on the latest electric stock, by curving the outer panels. External finish is malachite green, and these new carriages rank with those appearing on the other main lines.



L.N.E.R. Rebuilt "A1" 4-6-2 "Great Northern," now numbered 113 and painted blue, halted by signal at Hadley Wood. Photograph by H. C. Casserley.



The Short S.30 flying boat G-AFKZ "Cathay" in the floating dock at the Hythe base of the British Overseas Airways Corporation, by whose courtesy the illustrations to this article are reproduced.

Hythe – Home of the Flying Boats

By John W. R. Taylor

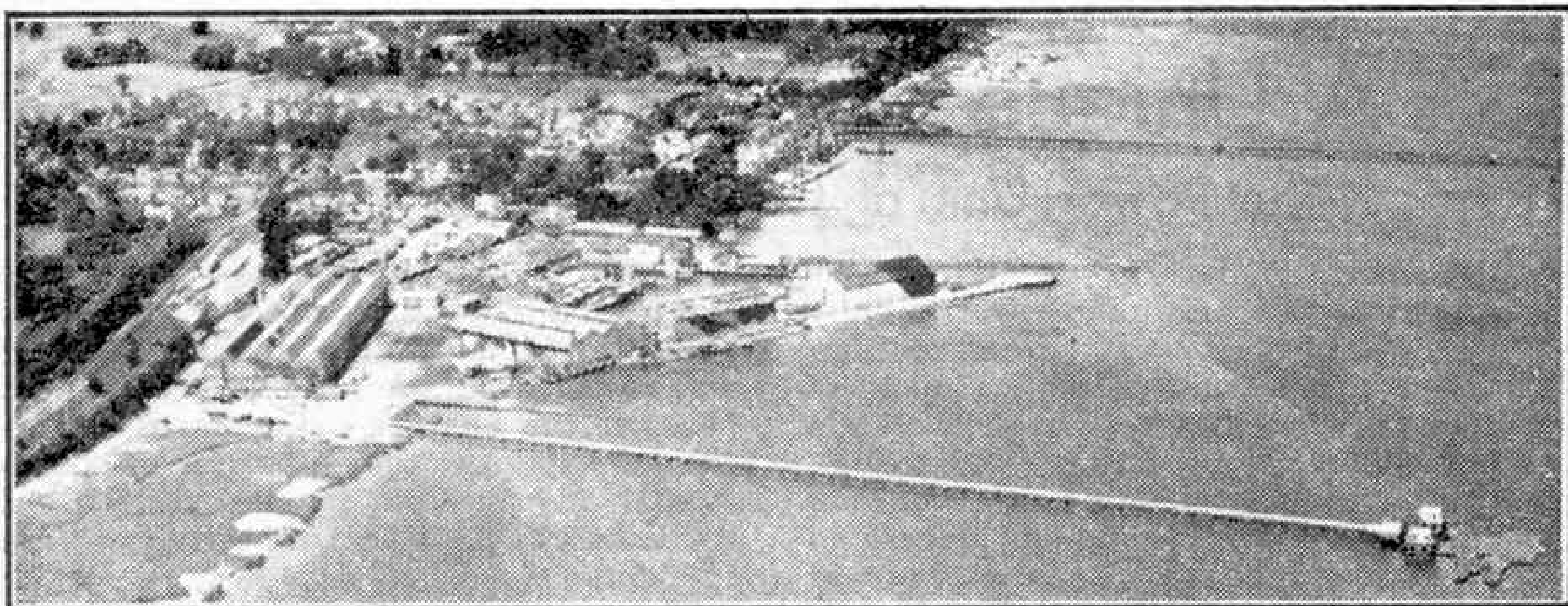
AT one of the most vital moments in our history, when it seemed sometimes that his inspired leadership alone gave Britain the will to carry on her tremendous struggle, Prime Minister Winston Churchill decided to fly home from America to this country. This proof of his faith in the safety of modern air travel was a triumph for British Overseas Airways Corporation, in one of whose flying boats he travelled. For when B.O.A.C.'s predecessors Imperial Airways ordered a new fleet of 28 flying boats in 1934, to operate exclusively over their Empire routes, officials of foreign air lines were delighted, as they could not foresee much competition for their new landplanes from comparatively slow flying boats. The last 10 years have proved how very wrong they were. In all 42 "Empire" flying boats were built by Short Brothers for Imperial Airways and B.O.A.C.; between them, in peace and war, they have flown more than 34,000,000 miles. For comfort, efficiency and ability to operate in bad weather, they have proved themselves superior to any landplane air liners in the world.

However good these flying boats might be, they would be useless without an efficient ground organisation to keep them operating reliably and regularly. For this reason, B.O.A.C. have developed a very fine Headquarters' base for their No. 4

Line, which operates the flying boats, at Hythe, on the Eastern bank of Southampton Water. A good idea of the size and layout of the place can be gained from the illustrations to this article; its efficiency is shown by the fact that, if necessary, aircraft can be completely rebuilt in the workshops.

The first Marine Base established by Imperial Airways was at Woolston, on the West side of Southampton Water, and it was from here that they operated their Channel Islands service in 1928. Next year it was transferred to Alexandria, where all civil flying boats were based until the inauguration of the Empire Air Mail scheme with the fleet of "Empire" boats made it essential to transfer the chief maintenance base to the United Kingdom. The present site at Hythe was chosen in 1936 and originally comprised a half-hangar, leased from the Supermarine Company, and a concrete apron. Since then it has grown very rapidly so that to-day the workshops, hangars and ancillary buildings alone cover some 12 acres, and a staff of 900 is employed. It is planned to extend the base by $8\frac{1}{4}$ acres in order to house and maintain the 12 new Short "Solent" flying boats now on order.

During the war the majority of the "Empire" flying boats were transferred to Durban as a protection against enemy air activity and to enable them to operate



The B.O.A.C. Maintenance and Overhaul Establishment at Hythe seen from the air. In the foreground are the new jetty and berthing stations.

the vital "Horseshoe" route between Africa, India, and Middle East. The B.O.A.C. fleet retained in Britain consisted of only a few "Empire" boats, used on the Atlantic route, plus a small number of "Catalinas." So for three years Hythe was employed chiefly on maintenance and repair work for the Royal Air Force.

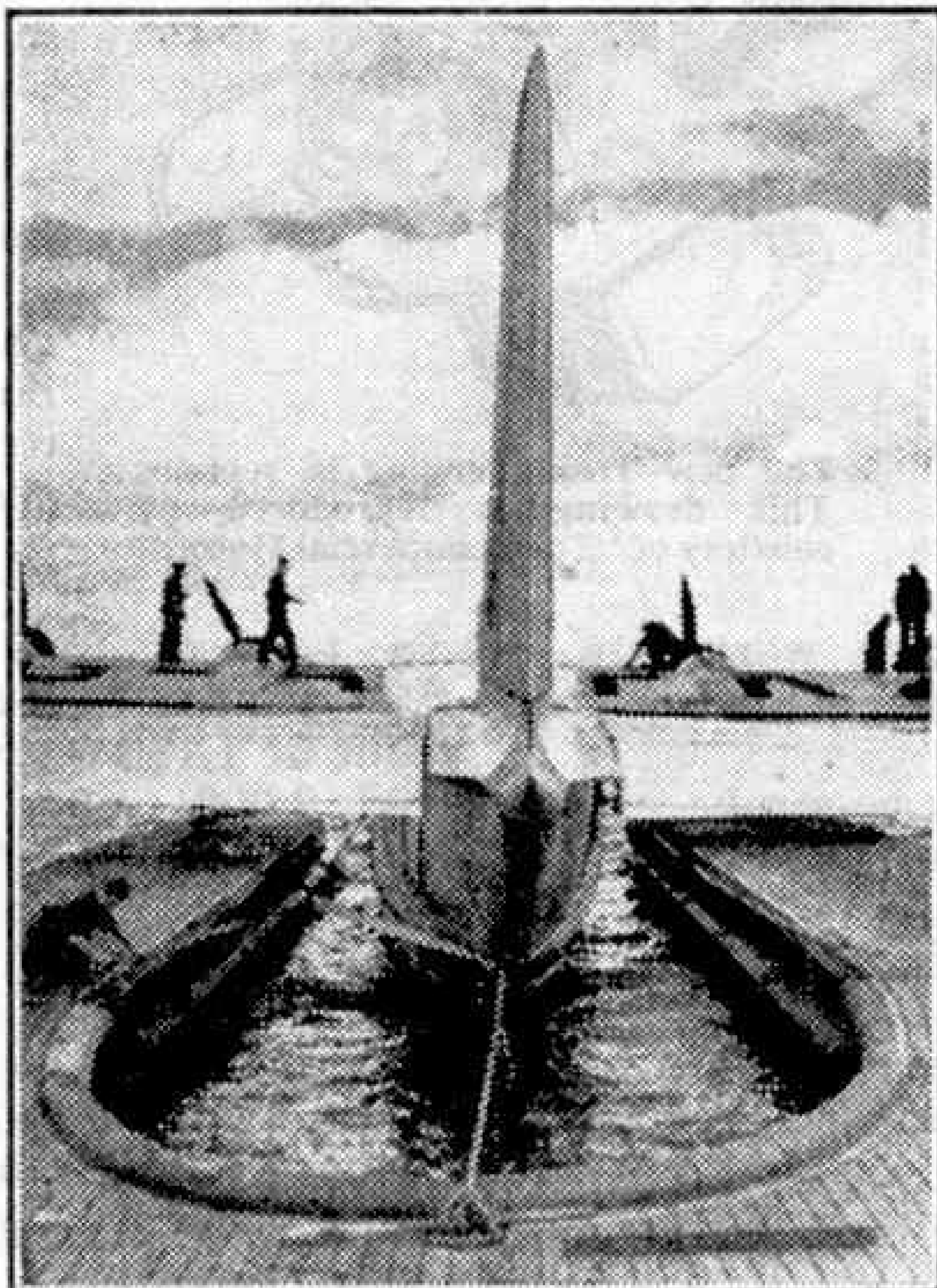
But by the summer of 1943 the volume of priority passengers and freight traffic to the East had increased to such an extent that the Air Ministry was persuaded to let B.O.A.C. have a fleet of their precious "Sunderland" III military transport flying boats. These aircraft each had austerity seating accommodation for 44 passengers, but were otherwise unfurnished. They operated the B.O.A.C. service very efficiently throughout the remaining war years and undertook many special missions of great importance. Nevertheless, they were hardly comfortable enough for ordinary passenger duties, so as soon as the war in Europe ended it was decided to build up at once an interim fleet of new civil boats. The "Sunderland" III was obviously still

the best basis to work on, but the whole interior was re-designed to provide a high standard of comfort for 22 passengers. So the fleet of 21 "Hythe" boats was born.

The work in each aircraft had to be done in stages, complete conversion only becoming possible as military requirements were reduced. The whole job was done by B.O.A.C.'s own technicians and craftsmen at Hythe, in spite of the fact that they also had to maintain enough aircraft to run the full schedule of six weekly services to India and the Far East. To

give an idea of what that means—maintenance of the schedule permits a "turn round" period of only three days at the end of each return trip, during which thousands of servicing inspections and operations must be attended to and any necessary repairs made before the aircraft is passed out as safe for its next flight.

To utilise fully every moment of the available time, the flying boat is airborne on its way to Hythe within 30 min. of alighting at the Passenger Base at Poole, where all passengers disembark and mail and freight are unloaded. This flight



Another view of "Cathay" berthed in the dock for overhaul.

(Continued on page 142)

A Unique Two-Stroke Engine

The Power Unit of the New Trojan Vehicle

IN the usual motor car or motor cycle engine there is only one power impulse in each cylinder for every two revolutions of the crankshaft. In another cycle of operations, which has been used in certain famous motor car or motor cycle engines, there is a power stroke for each revolution of the crankshaft; the whole process of charging the cylinder with a mixture of petrol vapour and air, compressing it, firing and sweeping out the burned gas is thus completed in one up and down movement of the piston. In this method the mixture is partly compressed either in a separate cylinder or in the crankcase of the engine itself, and the port or opening through which it is brought into the cylinder is uncovered by the movement of the piston.

The idea of this two-stroke arrangement is that the efficiency should be twice that of a four-stroke engine of the same cylinder capacity, as there is a firing stroke in each cylinder once in every revolution instead of once in two revolutions. In practice things don't quite work out so well as this owing to loss of charge and other troubles.

A fine example of a two-stroke engine is that designed for the well-known Trojan motor vehicle. Before the war Trojan cars and vans had a two-stroke power unit in which the charge was partly compressed in the crankcase before being transferred to the cylinder for burning. In the latest Trojan engine separate cylinders are used for this purpose.

The general layout of the new engine is shown in the drawing on this page. There are four working cylinders, coupled in pairs, and they are fed from two

separate charger cylinders, which are at right angles to the working cylinders, giving an engine that is roughly V-shaped and is balanced. A rotor is fitted in the head of the charger cylinders to control the passage of the mixture of petrol vapour and air from the carburetter, and its distribution to the respective working cylinders.

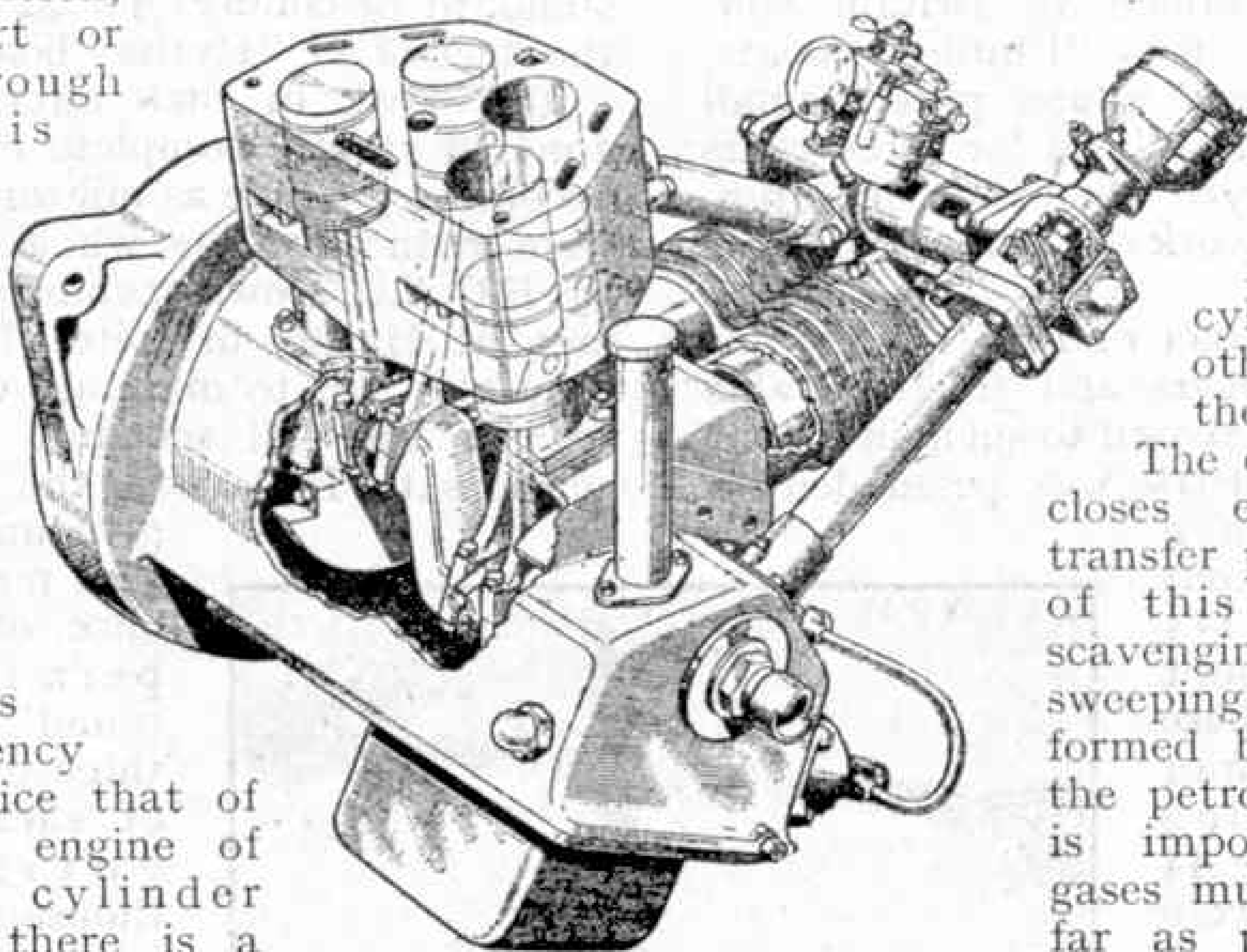
The pairs of working cylinders were a feature of the pre-war Trojan engine that is retained in the new one. The connecting rods from the pistons of each pair work on the same crank pin and the two cylinders of each pair have a common

combustion head. There are two ports for each pair, one for the transfer of the charge from the charger cylinder, and the other for removal of the burned gases.

The exhaust opens and closes earlier than the transfer port. The purpose of this is to help in scavenging, that is in the sweeping out of the gases formed by the burning of the petrol. This of course is important, for these gases must be removed as far as possible, to make room for the next explosive charge, if loss of power is to be avoided.

The power cylinders have a bore of 65.5 mm. and a stroke of 88 mm., so that the engine capacity works out at 1,186 cc., with a rating of 10.6 h.p. At 2,000 r.p.m. a brake horse power of 24 is attained. One of the special features of the engine is that it is a good puller at the lower end of its speed range. The carburetter is a Solex 30 mm. horizontal one. The engine is given a 3-pt. rubber mounting. A Borg and Beck single-plate clutch is fitted, and the gear box provides three forward speeds and a reverse, with synchromesh on top and second gears.

The frame of the new Trojan vehicle is interesting. It is built up from plate material by means of spot welding.



The new Trojan engine in section. This drawing is reproduced by courtesy of "The Commercial Motor."

Testing Brakes with Artificial Rain

By T. R. Robinson

THE Underground Railways of the London Passenger Transport Board form one of the most intensively loaded transport systems in the world. During peak traffic periods, the interval between trains is reduced to the absolute minimum necessary for safety of travel. Any delay on the part of one train would then slow down the whole service, so the trains are designed to possess very rapid acceleration. This in turn makes efficient brakes essential, and underground rolling stock is accordingly provided with a particularly powerful braking system.

Stringent tests are frequently made in order to keep these brakes up to full efficiency, and, as quite a large mileage of "Underground" track away from the centre of London is above ground, it is necessary to make these tests in wet as well as dry conditions. In recent years the tests for both acceleration

and braking having been made on a section of the Hounslow line, and this has been equipped with an "artificial rain" device, which can give the effect of a fairly heavy rainstorm whenever a test is to be made. The installation is novel, but very effective. It consists of lengths of piping, mounted alongside the track and provided at intervals with nozzles through which water from a pump is sprayed over the track, and against the wheels and under-carriage of the train undergoing test.

There are two spray pipes, mounted one on each side of the track, and running beside it for a sufficient distance to enable a thorough test to be carried out. The pipes have a diameter of one inch, and are carried on short metal standards 2 ft. 6 in. away from the running rails and 1 ft. 3 in. above them. Their nozzles

are spaced 3 ft. 6 in. apart, and are pointed upward to give fan-shaped sprays that blend into a continuous film. This covers the track, and also drenches the under-carriage, wheels and brakes of the passing train.

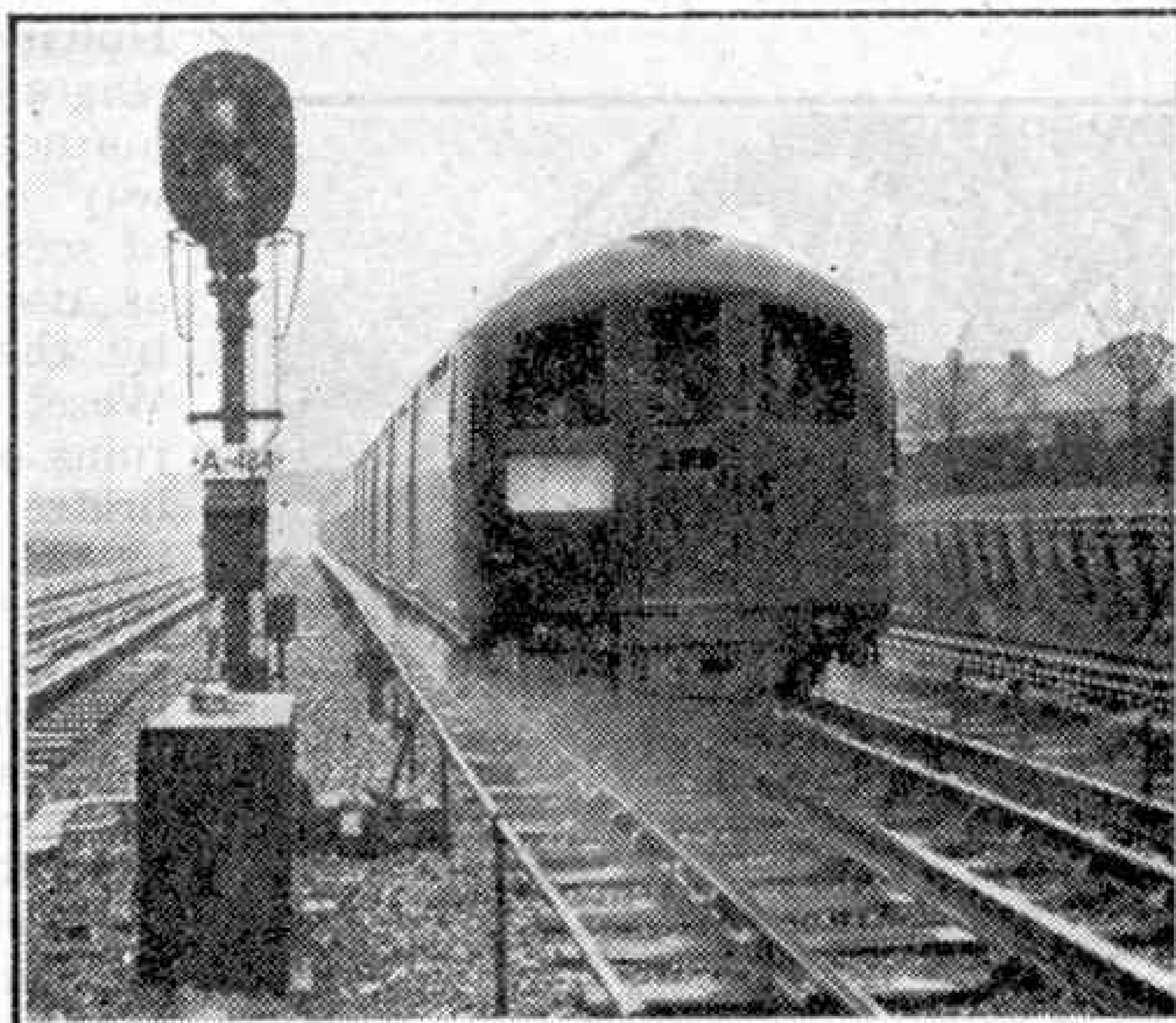
When a test is being carried out, the operator opens the control cock sufficiently to fill the pipes and produce a slight drip at the spray nozzles. A bell sounded automatically by the approach of the train gives him warning in ample time for him to open the cock fully, when the spray starts almost instantly.

The train enters the sprayed section of the track before starting to apply the brakes, and runs into a heavy spray which completely covers the track to approximately the level of the underside of the cars. The brakes are applied as soon as the whole length of the train is enveloped in the spray, and the

spraying continues until the train has come to a standstill. The time and distance taken to bring the train to a halt and the general behaviour of the brakes are noted, and comparison with a previously determined standard gives a measure of the efficiency of the braking system of the train under test.

The time that the spray lasts is normally about half a minute, but this is not by any means the limit, and the period can be extended considerably if necessary. The capacity of the equipment is such that a full and continuous spray can be maintained for as long as four minutes in case of need, and the result of this would be equivalent to a really heavy storm.

This testing device is a good example of the care that is given to every detail on the London Underground Railways.



A London Transport train passing through the section fitted with a water spraying device in order to test its braking in wet conditions. Photograph by courtesy of London Transport.

A Railwayman Abroad, 1944-46

III—Train Running in Germany

By D. S. Barrie, M.B.E.

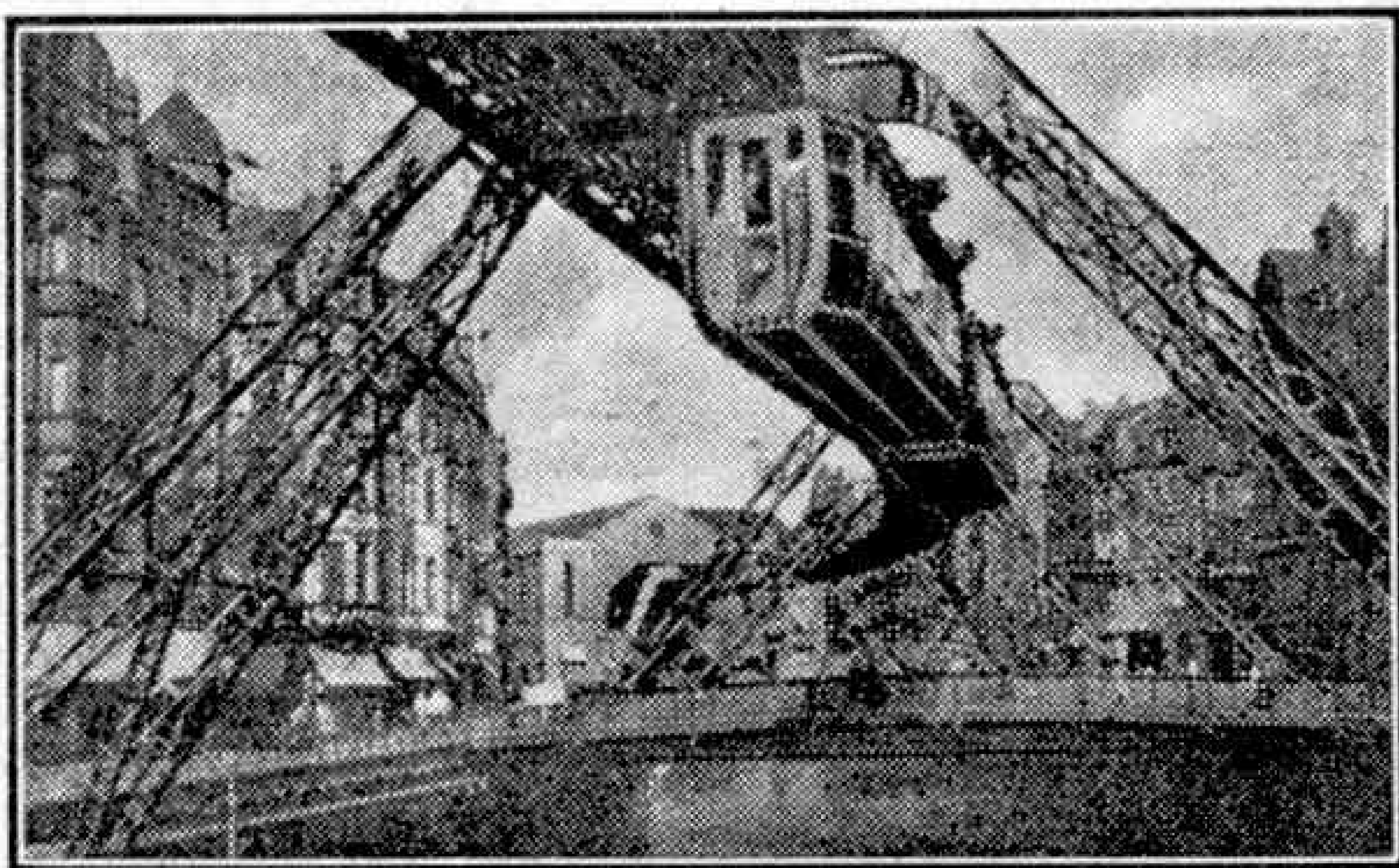
IN the early days of the occupation, train operation in Germany was a somewhat precarious business, but as rehabilitation proceeded and the number of slacks due to bomb and battle damage were reduced, speed and punctuality steadily improved.

My first rail journey in Germany was made in June 1945, from Osnabruck to Calais, in a 525-ton train of Belgian steel vestibuled stock. This was worked over the German section by one of the

by means of the long and slender military-built Victory Bridge at Spyck, our train was handed over at Cleve to the Netherlands Railways, who worked it forward with a W.D. 2-8-0.

In October 1945, I made a long rail trip from Minden to the Hook of Holland, in a train of mixed German, Austrian and Italian stock totalling 650 tons; this was worked by a 2-8-2 (No. 41.351) to Osnabruck, and then to Nijmegen in

Holland in two successive stages by 2-10-0s. This journey yielded little in the way of speed, but much of scenic interest inasmuch as after crossing the Rhine by the military bridge at Wesel (alongside which the ruins of the blown-up steel bridge lay in fantastic chaos in the river) we traversed, through Geldern, Weeze, and Goch, the war-torn country which had witnessed such bitter fighting in the advance from the Maas to the Rhine. Despite extensive clearance of the battlefield, derelict German tanks and guns were still to be seen lying about, the lineside was littered in

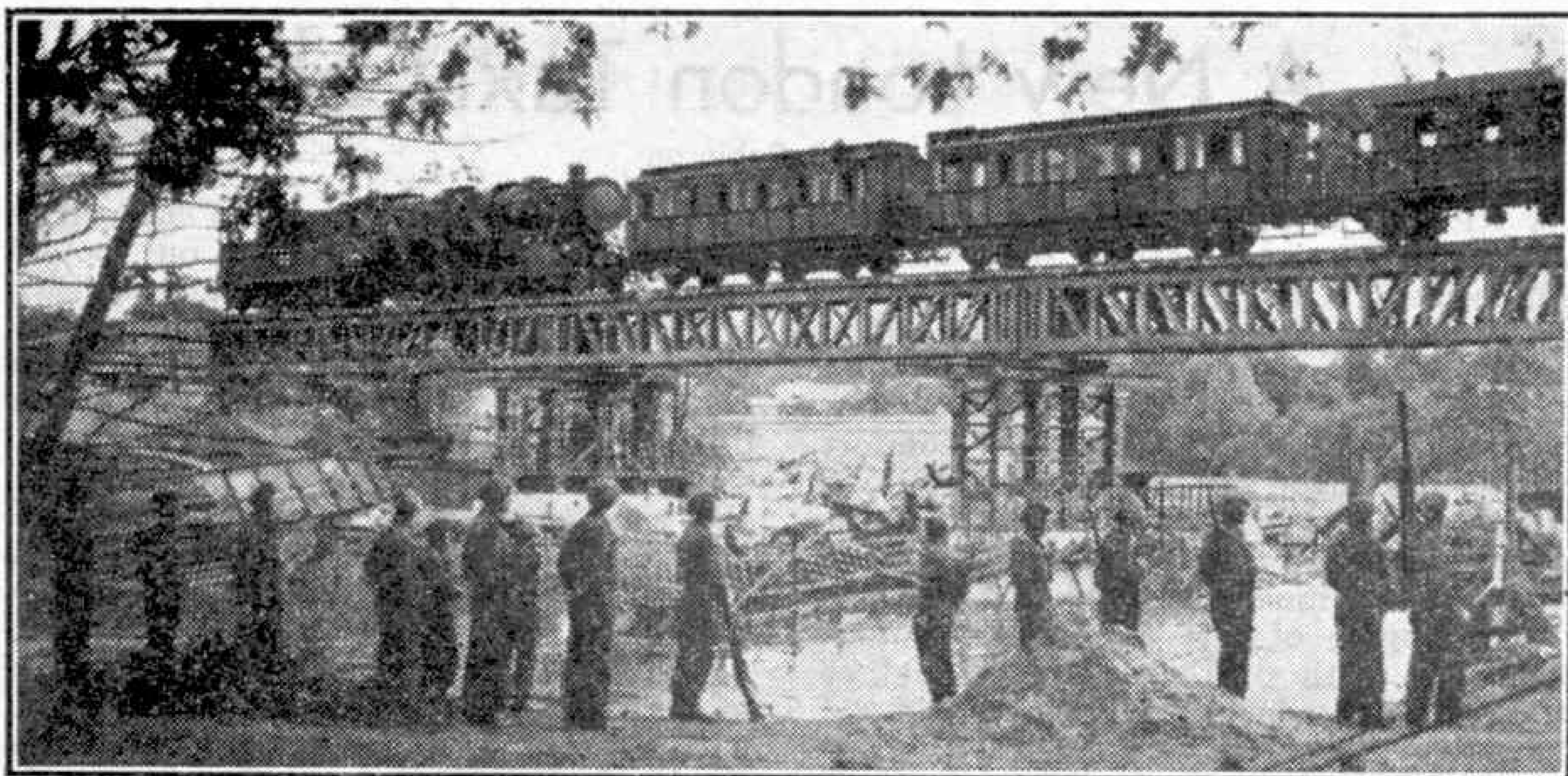


A view of the remarkable suspended railway between Elberfeld, Barmen and Wuppertal, showing how the track is curved to follow the course of the River Wupper.

Reichsbahn "austerity" 2-10-0s, No. 52.2003, fitted with one of the condensing tenders mentioned in a previous article. Our route lay via Munster (where the widespread railway damage included one locomotive standing on its "nose" in the street and another almost completely buried in a large crater) and via Haltern to Wesel on the Rhine; on the rare occasions when we got a clear road, we covered distances of 17 miles, with several slacks, in 29½ min. start-to-stop (maximum 47 m.p.h.) and of 25½ miles, with further slacks, in 51½ min., the maximum on this latter stage being 50 m.p.h. From Wesel, we turned up the east bank of the Rhine through Emmerich, passing near Wesel much debris of gliders and equipment left after the daring operation by the British airborne troops at the time of the Rhine Crossing. After passing over the Rhine

places with empty shell-cases and wreckage of rolling-stock, and the once neat little stations through which we passed were in ruins.

In December 1945, a through passenger train for British service personnel was instituted in both directions between Bad Oeynhausen, Hanover and Berlin. Between Berlin and Helmstedt (the junction which forms the exchange point between the British and Soviet Zones) this train was worked by 2-10-0 engines, and the schedule was very easy, but west of Helmstedt some quite interesting running was to be recorded. One day on the westbound train with a load of eight cars, 350 tons tare, "Pacific" 03.109 gave me my first recorded "60" in Germany, covering the first 20 miles out of Helmstedt in 25 min., with a running average of 55 m.p.h. for 16½ miles. A series of severe



A train crossing a 250 ft. unit-construction bridge on the Hanover-Hamburg main line built in four days by the Royal Engineers. The engine is one of the powerful German 2-10-0s.

permanent way slacks was met with in the Brunswick area, but the mile-a-minute rate was again attained afterwards, and the 59.7 miles (approx.) from Helmstedt to Hanover completed in 84 min. exactly.

In the eastbound direction with the Berlin train (load 342 tons and "Pacific" 03.089) I noted a time of 54 min. over the 40.2 miles from Minden to Hanover, despite a p.w. slack and much easing in the later stages; the overall average was 44.6 m.p.h. start-to-stop, and the maximum, 57. On the continuation of the same run east of Brunswick, with No. 03.013 of the same 4-6-2 class, the final 23 miles into Helmstedt were run in 33 min. with a maximum of 62 m.p.h. The "crack" steam train, however, was not the Berlin service but the "*Rhine Army Special*" (restaurant and sleeping cars) between Bad Oeynhausen and Calais, loading to about 400 tons and worked over successive stages of its journey by German "Pacifics," a W.D. 2-8-0 (over the Dutch section via Roermond), a streamlined Belgian "Atlantic," and a French "Pacific" or 4-6-0 over the final section between Tournai and Calais. On the only run which I made with this train (416 tons), our "Pacific" was piloted by a 50 Class 2-10-0 working home to Hamm; a time of 32½ min. which was noted for the 18½ miles from Bad Oeynhausen to Herford (maximum 50 m.p.h.) included a very prolonged slack over the diversion line, with fearsome gradients, constructed round the ruins of the Schildesche Viaduct. This huge structure of masonry was

effectively destroyed during the latter stages of the war by pin-point bombing, thus cutting one of the main rail exits from the Ruhr.

Early in 1946 a number of fast railcar services was introduced for Service travellers in Germany, the units employed being diesel-electric two-car sets having about 50 seats. On a journey in one of these cars to Cologne (where the tangled and twisted girders of the great Hohenzollern Bridge lying in the Rhine afford one of the great spectacles of post-war Germany), we covered 41.5 miles from Herford to a signal stop outside Hamm in just under 45 min., 60-62 m.p.h. being steadily maintained on the level. On this trip, incidentally, we obtained excellent views of the unique suspension railway between Elberfeld, Barmen and Wuppertal, on which the electrically-operated cars hang from an overhead rail.

On another railcar trip, this time to Hamburg, some quite fast times were recorded, successive start-to-stop stages being covered as follows: Buckeburg-Hanover, 34½ miles in 41 min.; Hanover-Celle, 25¾ miles in 33¾ min.; and Celle-Uelzen, 32¾ miles in 42½ min. All these times included one or more p.w. slacks, the maximum speed in each case being 60 m.p.h. or just under.

Hamburg, one of the great German railway centres, afforded much of interest, especially on the four-track urban section between Hamburg Central and Altona where steam, electric and diesel-electric traction could be seen together.

A New London Taxi-Cab

By T. R. Robinson

A NEW type of taxi-cab that has some of the luxury features of a modern limousine, as well as many technical improvements, is now in service in the London area. It is known as the "Oxford," and is a product of the Nuffield Organisation. The cab is designed to give more comfort to the passenger and better protection to the driver, and at the same time to withstand the hard and continuous service which a cab must endure.

The engine of the new cab has four cylinders, with overhead valves, and as this kind of vehicle is often called upon to travel considerable distances in low gear when running in dense traffic, particular care has been given to lubrication. The system employed is the dry sump type, and the oil tank reservoir is mounted below the radiator and in the air stream caused by the forward movement of the cab to provide for effective cooling. Filtering of the oil also is very thorough, internal and external filters being fitted to the system.

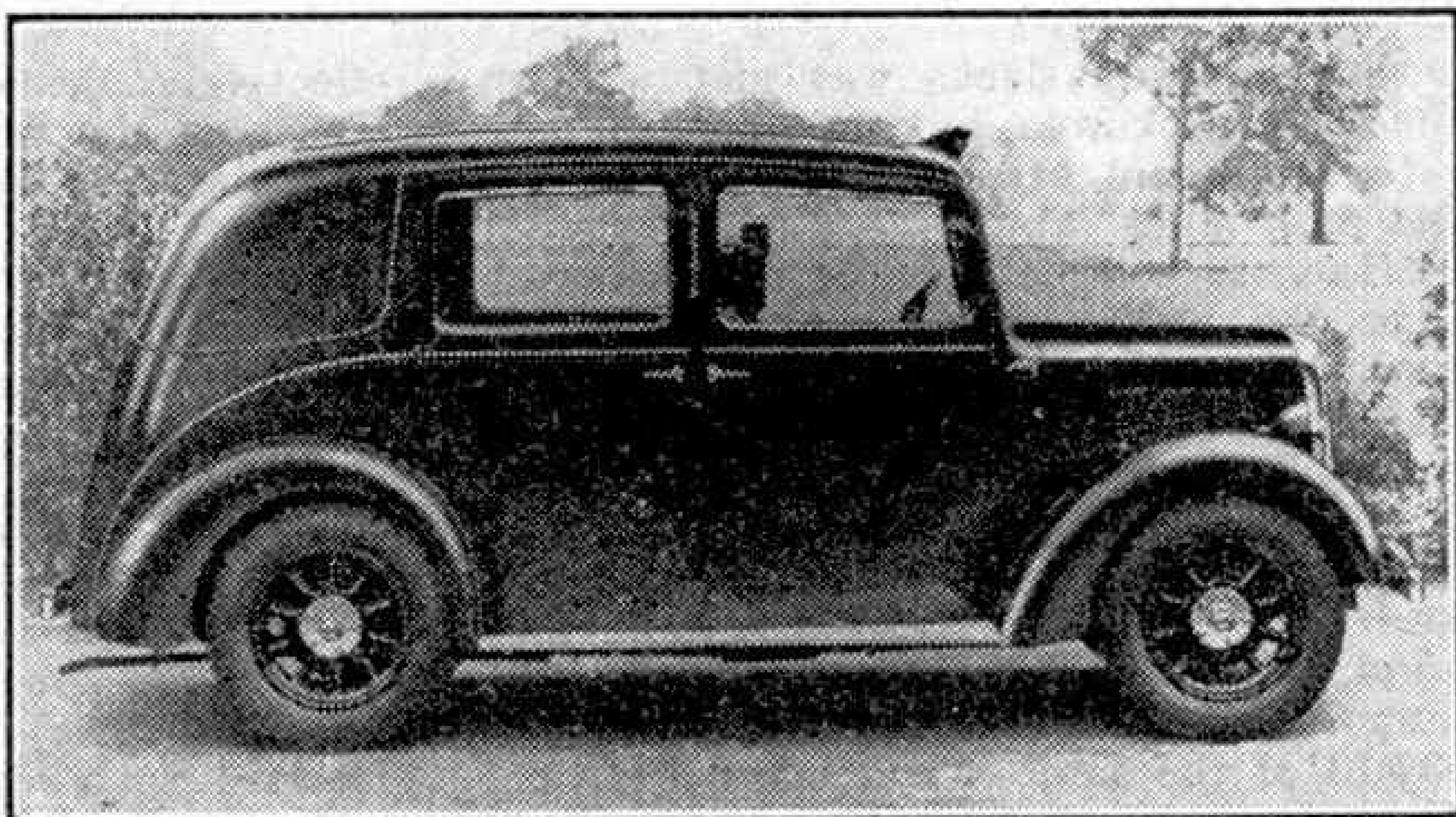
The clutch and gear-box are both sturdy in design, the latter providing four forward speeds and one reverse. Three of the forward speeds are of the synchromesh type, and both the speedometer and taxi-meter drives are taken from the gear-box. The transmission, axles, brakes, and steering gear are all of heavy duty form, with particular care given to easy maintenance. The rear axle drive is of the underslung worm type.

Many of the details of the cab are similar to those of a modern private car. These include Girling brakes, a voltage-controlled charging dynamo, illuminated dashboard instruments, stop and reversing lights, flush fitted self-cancelling trafficators, twin electric windscreen wipers, and an electric horn with a specially deep tone.

The body, which is very roomy, has a wooden framework, reinforced at some points by metal plates, and is panelled with stout steel sheet. The doors are wide,

and a new feature of special interest is the provision of a full door on the off side of the driver's compartment, with a window of the spring-balance type. This will give much better protection against bad weather, an important point for drivers who must be on the road in rain, sleet, and snow. To improve the visibility, the windscreen is of the one-piece type, and is arranged to open in the same way as the screen of a private car.

Luggage is carried in the driver's compartment, and the floor of the near side is sheathed with metal plates and fitted with straps to secure trunks and cases firmly during journeys. An important feature of the driver's compartment is the



This new London taxi-cab is remarkable for moderate streamlining, a closed compartment for the driver and other interesting features that suggest a modern limousine. Photograph by courtesy of Wolseley Motors Ltd.

seat, which has been specially designed to give the utmost comfort, and so avoid the fatigue which arises from driving in an uncomfortable position.

A striking and useful new fitting is a large illuminated "For Hire" sign, which is fitted above the windscreen. This is designed so that its illuminated wording can be read quite well in daylight, and the lamps inside the sign are automatically switched on when the taxi-meter flag is raised and extinguished when it is lowered.

The design of the cab involved many problems, for London "taxi" construction is governed by definite regulations. A prototype vehicle was tried out on the London streets, and as a result of experience with this the new model has been constructed and approved.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

CATACOMBS

Catacombs are extensive underground tunnels made by the early Christians for burial purposes. During persecutions the Christians used the catacombs as hiding places, and they also held religious ceremonies there.

Although most Italian cities have catacombs, the most famous are those at Rome. The bodies of many Catholic saints were originally buried there, but about the seventh century thousands of relics of the early martyrs were taken out of the catacombs and given a reverent burial in the Pantheon. Ironically enough, this had been a pagan temple when the people whose relics were being buried there were being massacred.

The catacombs at Rome are said to have contained over six million bodies, and are also reputed to have been scores of miles in length. Only six miles of them were accessible in 1939, however, and owing to the war, we no longer know how much of them is accessible now.

P. W. SMITH (Morden).

THE YARN MARKET OF DUNSTER

When I was staying at Minehead in Somerset some while ago, I was able to pay a visit to the quaint old village of Dunster. There the most prominent feature in the High Street, formerly known as "Chepyng Strete," is the Yarn Market. This was erected by George Luttrell in 1609.

The building stands in the middle of the street and is octagonal in shape. The timbers of the roof, now well overgrown with moss, bear evidence of rough treatment in the times of the Civil War, and one can see where one of the beams was pierced by a cannon ball fired from the castle during a siege in the 17th Century. There are the initials G.L. and the date 1647, which is presumably the date when the beam was repaired.

A more ancient edifice in Dunster is the castle already mentioned. Parts of this are supposed to date back to the time of Henry III or Edward I. Local tradition has it that there is a secret tunnel from the castle to a nearby lookout tower. I myself have seen the

end of what might be a tunnel, but unfortunately it was blocked up by stones and rubble and I couldn't explore the opening properly.

R. TOURRET (Farnborough).

LUCKY STRIKES!

"Gold is where you find it," is a familiar adage and rightly so! There have been many instances of its truth. A seventy-year old gold prospector at Kalgoorlie in Western Australia, claimed to be the richest square mile of earth in the world, ceased work on the building of a house to light a cigarette. His eyes caught the glint of gold on the ground, and he stooped to pick up a stone, which was found to be a nugget of gold shaped like a key.

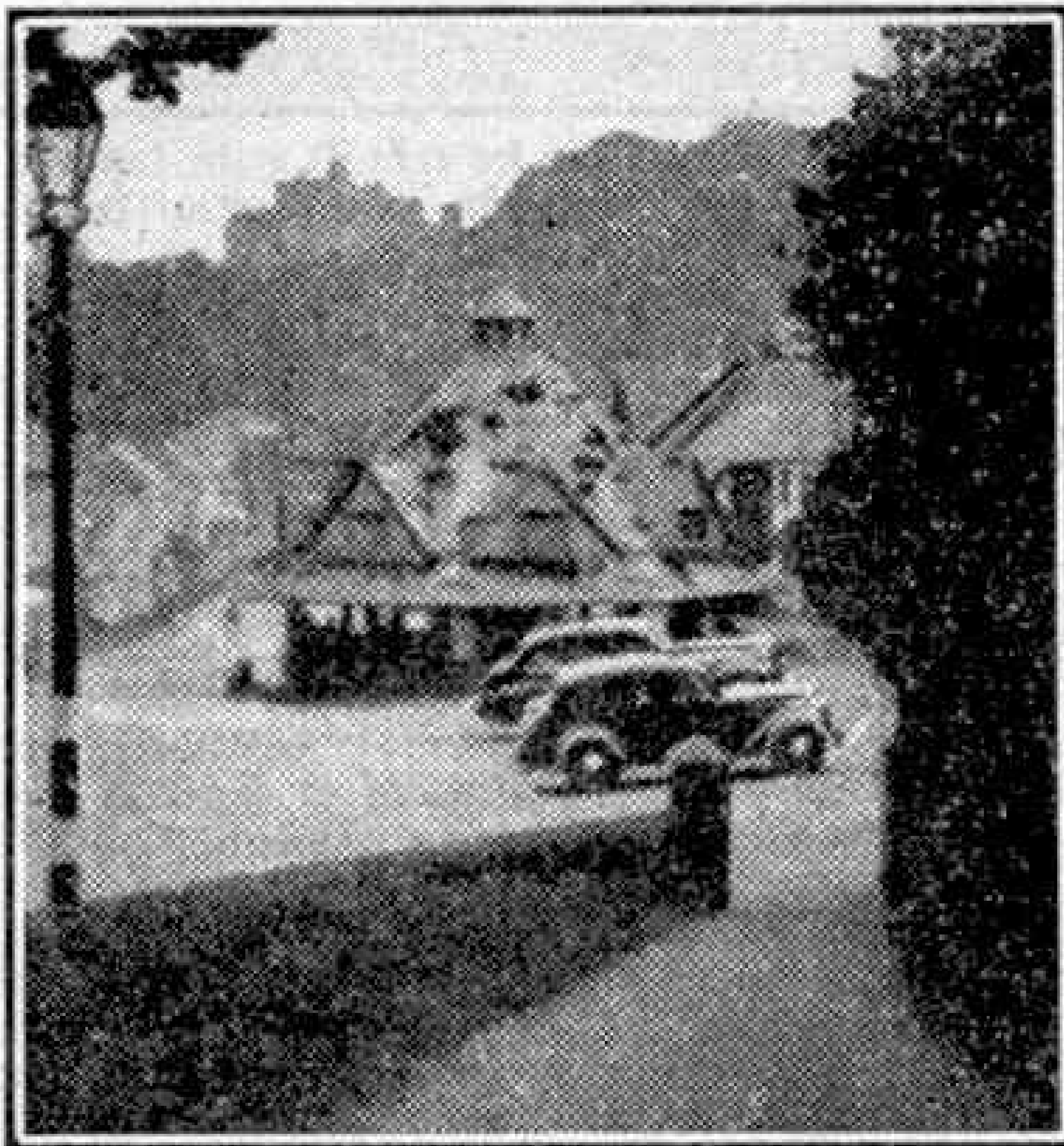
A Western Australian miner once picked up a stone to throw at a rabbit, which disappeared. The miner retained the stone in readiness for the next rabbit, but on glancing at the missile he found it to contain golden specks. From the place where he picked it up he extracted many thousands of pounds worth of gold.

The discovery of gold in Kalgoorlie itself is another example. In 1893 a party of miners looking for gold in Western Australia ran out of water. Two of them, Paddy Hannan and Flannigan, went searching for a spring and to round up some wandering horses, and Hannan found a slug of gold in one of the horse's footprints. At Kalgoorlie there may now be seen a statue of Paddy Hannan sitting on a rock, with his pick beside him and a water bag in one hand.

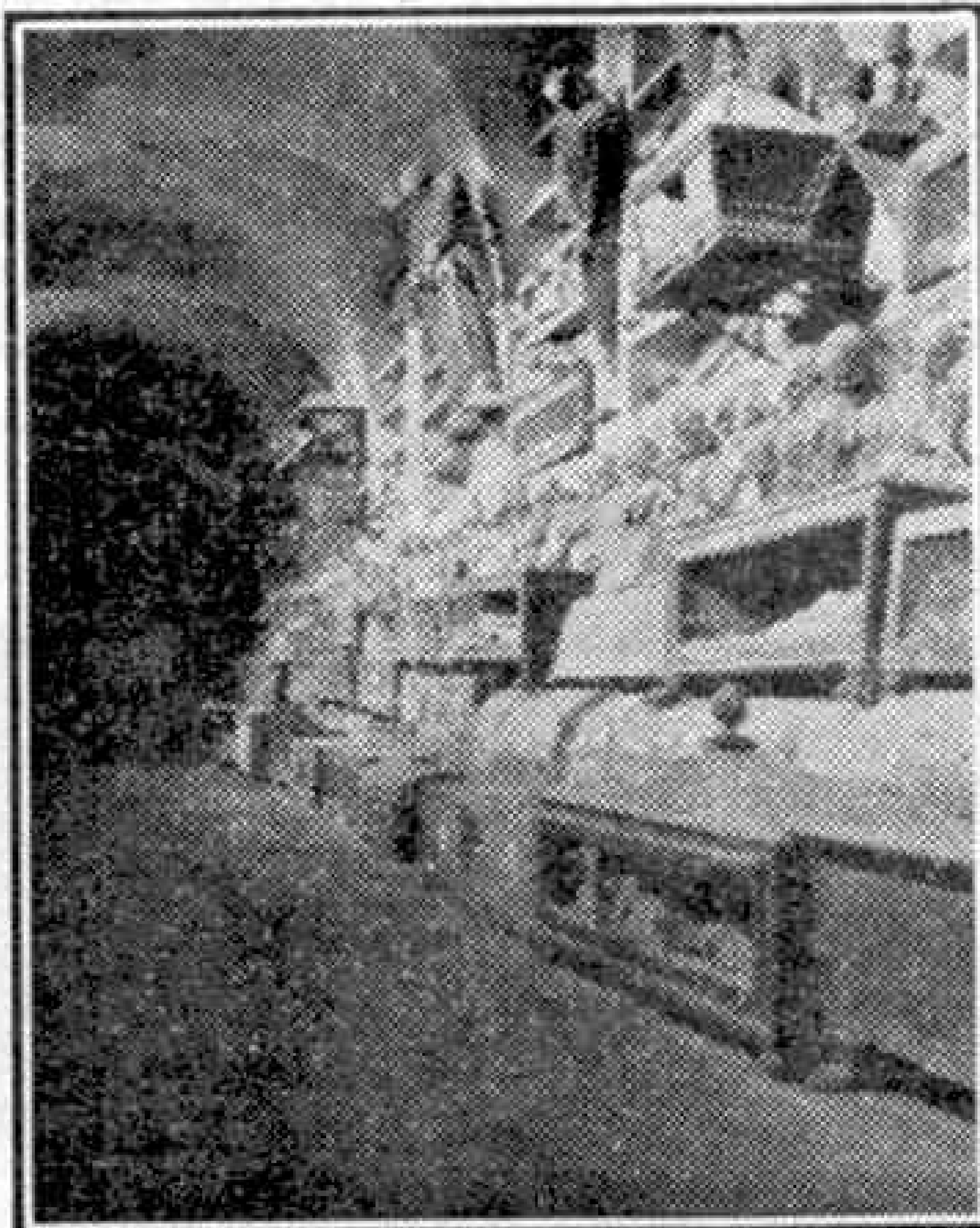
On one occasion a man actually tripped over gold. He did this while walking along a mountain track in Queensland. He dislodged a piece of stone with his foot, and on looking back at the obstacle he saw that it contained gold. The find occurred near Mount Morgan, which mine possesses both a richness in copper and gold products.

Perhaps the most curious instance of all is that of a gold seeker in Queensland who believed Dame Luck to be against him and gave permission to the local council to dig a refuse pit on the land. While sinking the pit, one of the council employees struck a reef carrying gold!

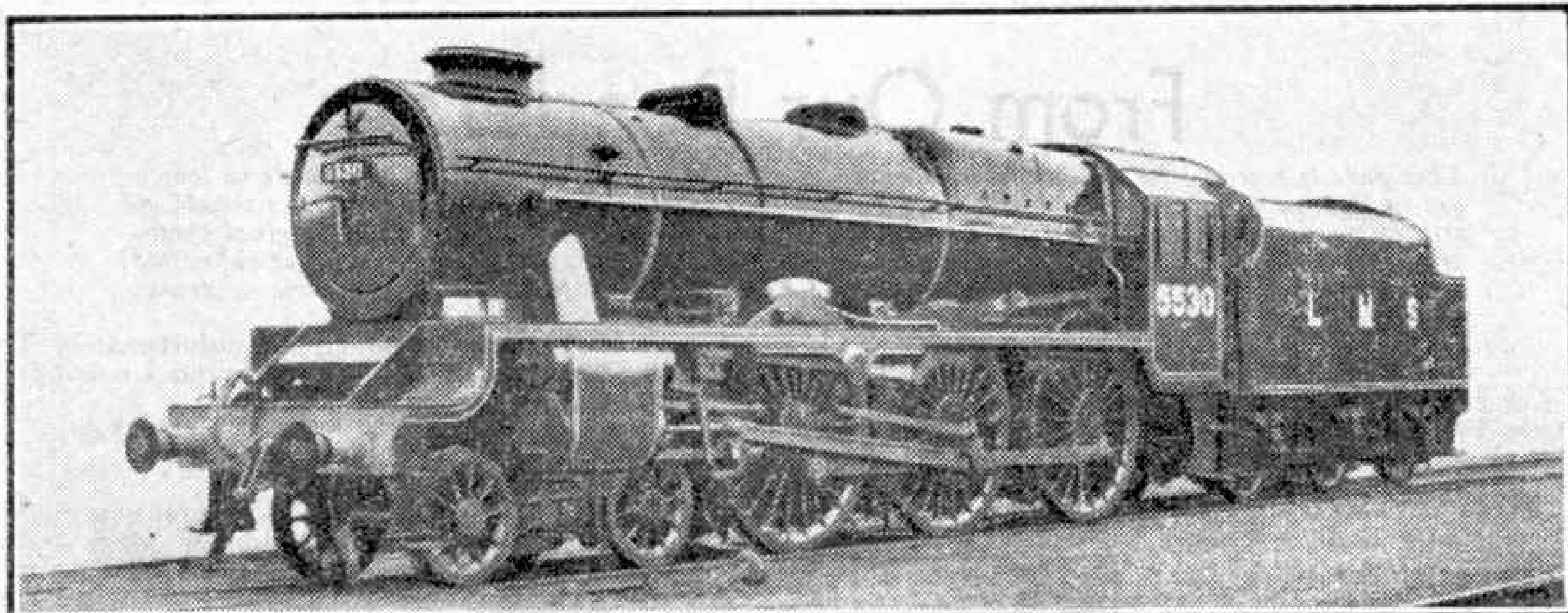
K. ALLEN (Oatley, N.S.W.)



The Yarn Market of Dunster. Photograph by R. Tourret, Farnborough.



In the catacombs of Palermo. Photograph by P. W. Smith, Morden.



No. 5530 "Sir Frank Ree," one of the first "Patriots" to be rebuilt with tapered boiler and double chimney. The photographs to this article are by courtesy of the L.M.S.

Tapered Boilers for L.M.S. "Patriots"

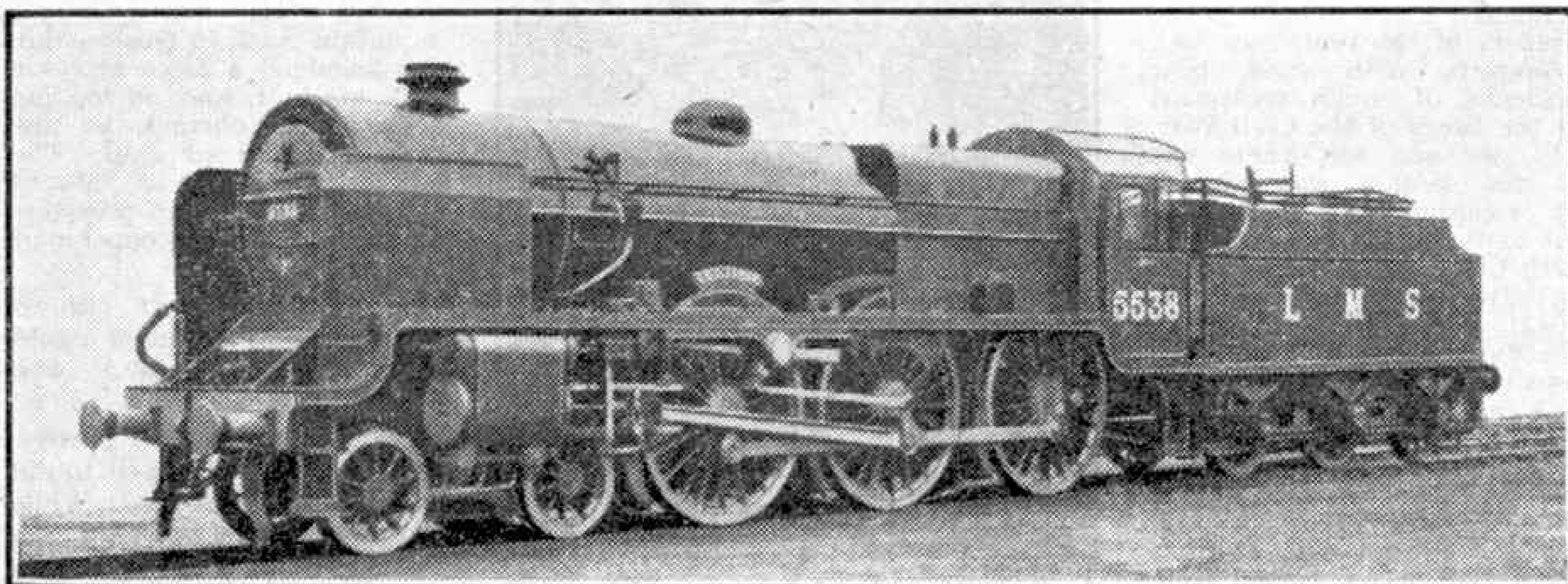
FOR many years now the 5X class "Patriot" 4-6-0 express engines have been familiar on L.M.S. lines, chiefly on the Western and Midland Divisions, and they have proved sound and speedy performers on trains suited to their capacity. In their neat appearance in spite of smoke deflectors, and in general details, they may be said to have continued former Midland traditions with their raised smoke-boxes, the rounded eaves to their cab roofs and the typical Derby flat-sided tender.

Altogether 52 of the class were completed during the years 1930-34 and these now carry the numbers 5500-51. Before the 1934 L.M.S. renumbering many of them carried miscellaneous numbers between 5900 and 6029, for nominally at least the "Patriots" were considered as rebuilds or conversions from the former four-cylinder 4-6-0s of the L.N.W.R. "Sir Gilbert Cloughton" class. This drastic rebuilding, or rather conversion, marked the final step in the efforts of the L.M.S. locomotive authorities of that time to improve the general standard of performance of the "Cloughtons," which as a class had a somewhat indifferent reputation. The first conversions were carried out during the time when Sir Henry Fowler was the L.M.S. Chief Mechanical Engineer which accounted for the almost Midland aspect of the "Patriots." Incidentally "Sir Frank Ree," shown above in its latest form, was also one of the first of the

original conversions as No. 5902.

With a number of the class falling due for new boilers the Chief Mechanical Engineer of the L.M.S., Mr. H. G. Ivatt, decided to make use of the same design of tapered boiler which had already been used with conspicuous success on the converted "Royal Scots" and on two of the Stanier "Silver Jubilee" engines Nos. 5735 and 5736. The opportunity also has been taken to renew various details such as the cab, smoke-box and saddle, the cylinders and the spring suspension, so that the converted engines become practically identical with the rebuilt "Jubilees" previously referred to. Although the cylinders now have a diameter of 17 in. in place of the original 18 in., the raising of the boiler pressure from 200 to 250 lb. per sq. in. increases the tractive effort from 26,520 lb. to 29,590 lb. So the engines now have the L.M.S. power classification "6" instead of the previous "5X," yet the whole conversion has increased the engine weight by only 1 ton 5 cwt., while the power potentialities have been very much increased.

Following the latest L.M.S. practice, the rebuilt engines are being provided with rocking grates, self-emptying ash pans and self-cleaning smoke-boxes. The earlier type of tender is now replaced by a standard 4,000 gallon vehicle, which completes the transformation from the earlier Derby standards to the latest practice as developed on the L.M.S.



"Patriot" class locomotive No. 5538 "Giggleswick," showing the typical appearance of the class before rebuilding.

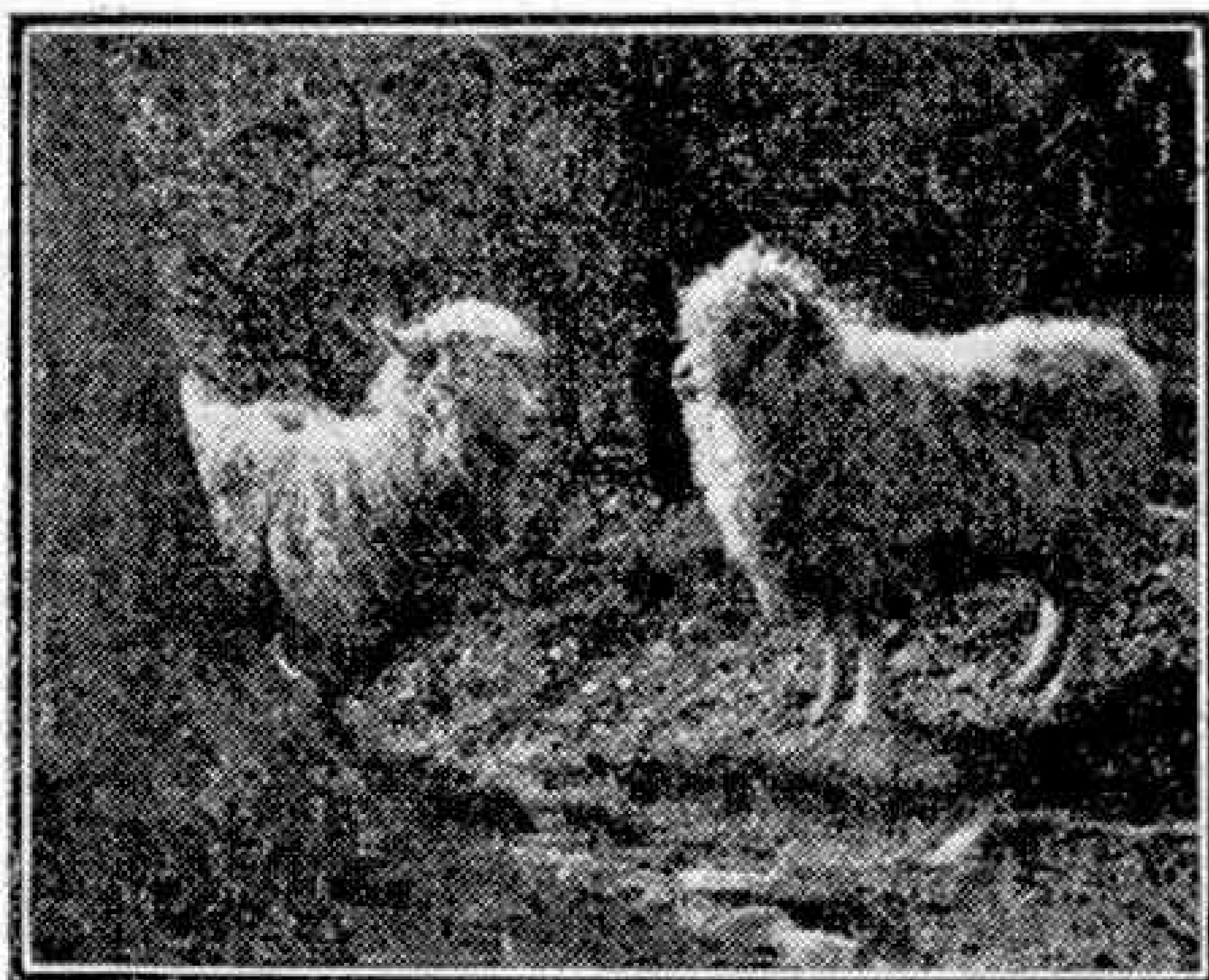
Photography

Against the Light

By E. E. Steele

THE old advice to "photograph with the sun at your back" still persists, but it is responsible for some very poor prints. What is really meant by the old rule is that the sun ought not to be shining into the lens; but provided that the lens is properly shaded from direct light rays, some very fascinating shots can be made with the camera deliberately pointed into the light.

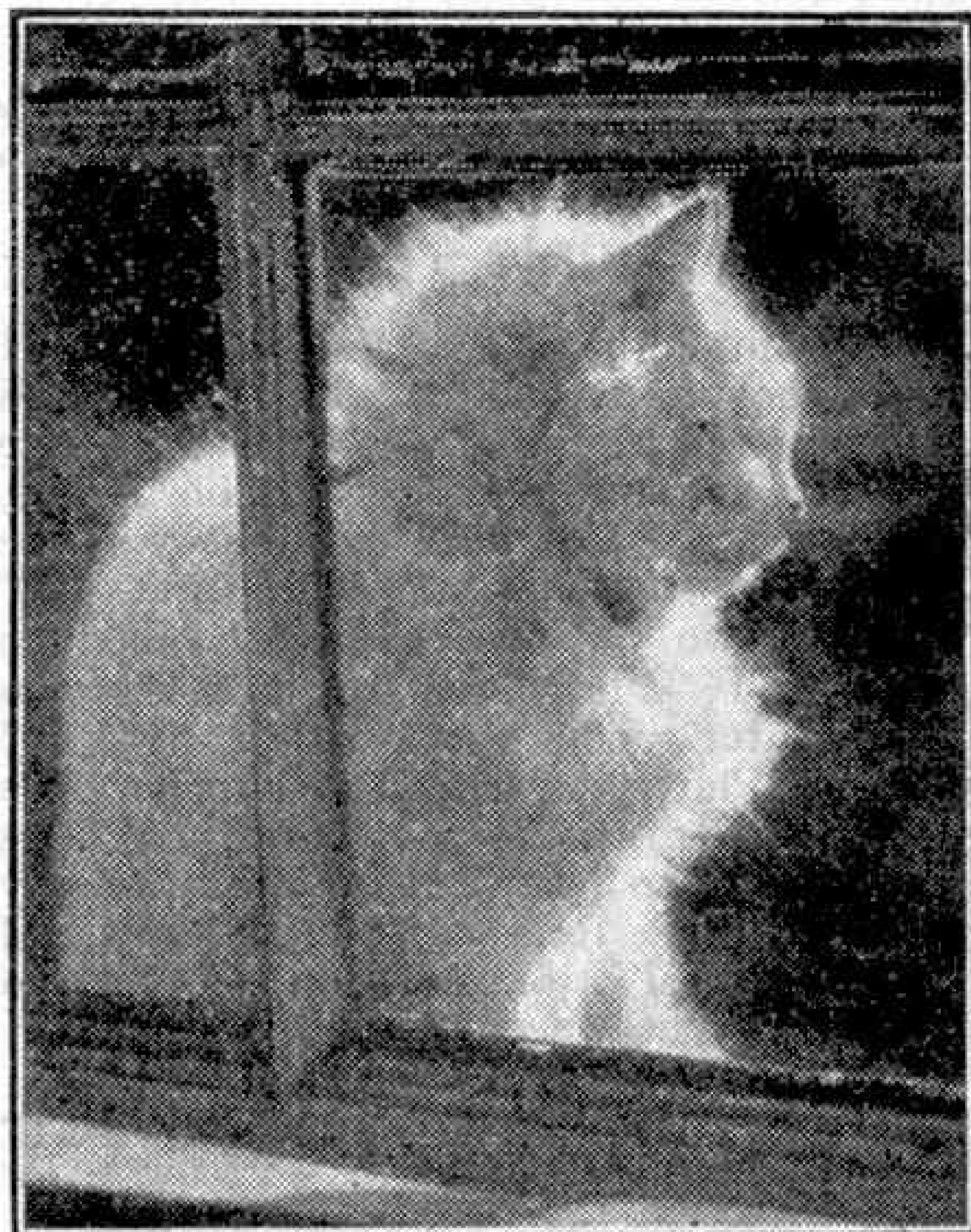
An object seen against the light will



Have you seen my lamb?

appear to be surrounded by a halo or rim of light. Actually you are looking at the shadow side and the light is creeping round the edge. It is this rim of light that provides the charm of the "against the light" method.

A lens hood is essential for this work in order to prevent the rays from reaching the lens and causing reflections that will fog the film. A suitable hood can be improvised from a cardboard tube, blackened inside, but take care not to make it too long or the corners of the picture will be cut off. The right length can be determined by setting the shutter to "time" and holding a piece of ground glass in the back of the camera. If you now look through, it will be seen if the corners are being cut off. The lens of a box camera is usually recessed, and this acts as a fairly efficient hood.

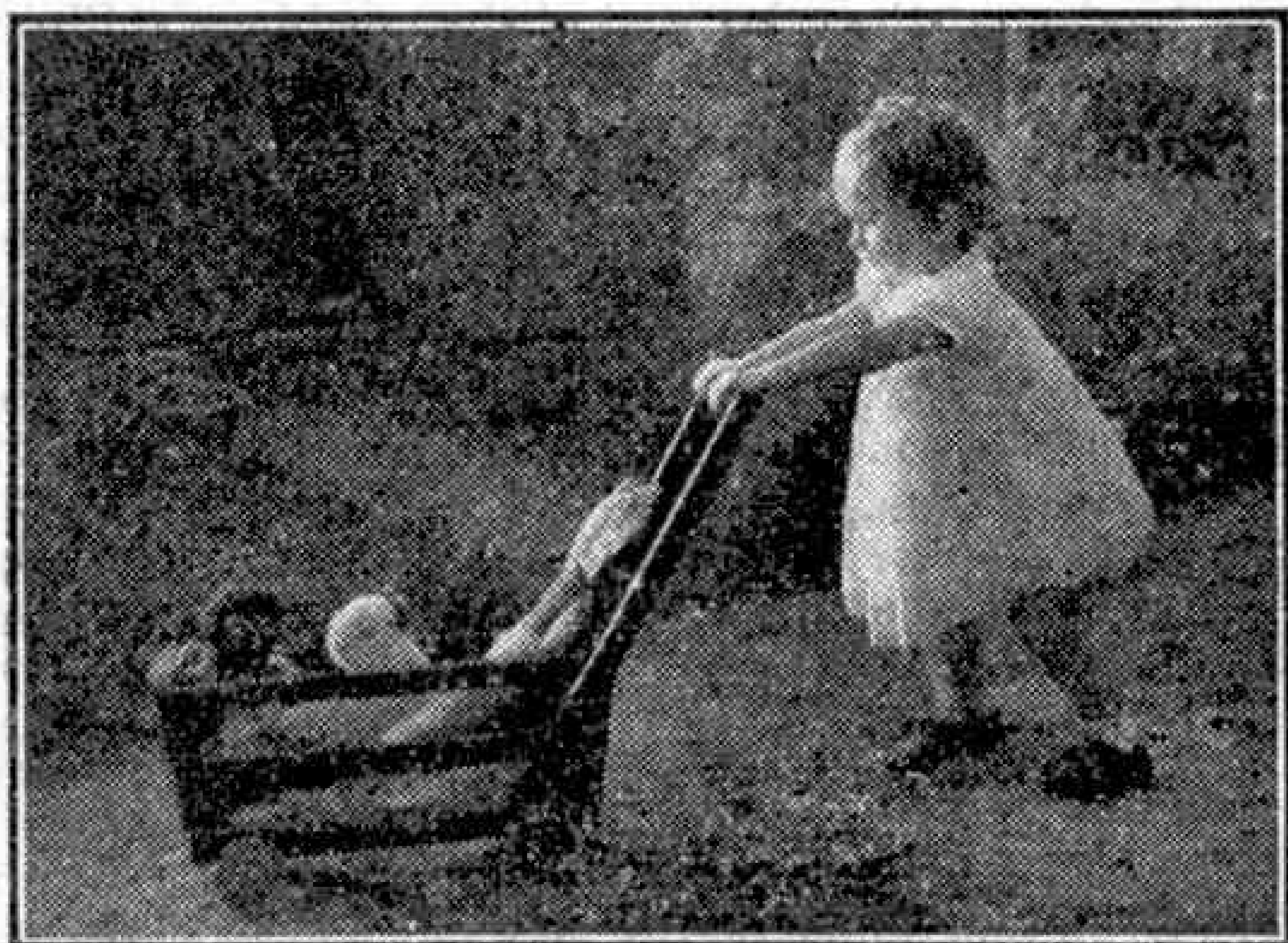


Snowy enjoys the morning sunshine.

As you are actually photographing the shadow side of the subject, the exposure must be increased two or three times.

Many objects are improved by shooting into the light, but not directly into the sun. An angle of 45 degrees from the front is usual, as in the photographs of the little girl and of the sheep. The subject is well isolated by this method, and appears to have depth and relief; whereas if you photograph with the sun at your back, the subject is flattened and lost against the background.

On your next film try one or two shots against the light by way of experiment.



Happy days.

New Meccano Models

Simple Hand Loom – Bridge – Rocking Horse

THE simple hand Loom shown in Fig. 1 is begun by building the base. This consists of a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate mounted on two $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates, which are fixed at each side between the flanges of the Flanged Plate and $12\frac{1}{2}"$ Strips. Two $5\frac{1}{2}"$ Strips are attached to the $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates, and between their outer ends they clamp $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates to vertical $5\frac{1}{2}"$ Strips. The upper edges of the $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates are bolted to the $12\frac{1}{2}"$ Strips already mentioned. A Rod carrying at each end a Road Wheel is journalled in two vertical $5\frac{1}{2}"$ Strips at the front of the model.

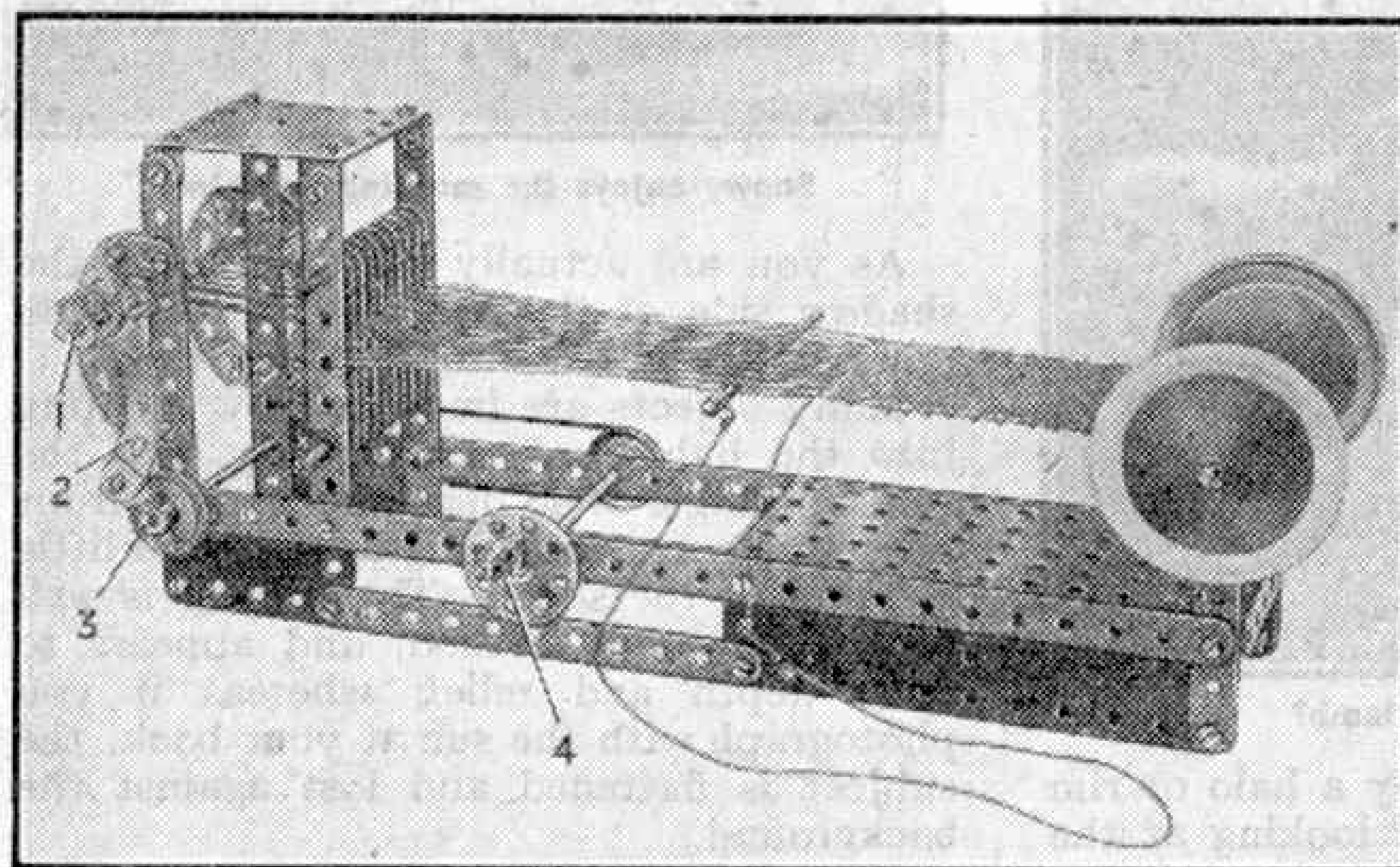


Fig. 1. A simple model hand Loom.

Construction of the warp separating mechanism at the other end of the machine is begun by attaching two $2\frac{1}{2}"$ Curved Strips to the rear pair of vertical $5\frac{1}{2}"$ Strips by two Fishplates, in the manner shown in the illustration. Nine $2\frac{1}{2}"$ Strips spaced from each other by Spring Clips are then placed vertically between the middle pair of vertical $5\frac{1}{2}"$ Strips, and a $3\frac{1}{2}"$ Rod is pushed through their end holes as shown. The Rod 1 is passed between the Curved Strips, each end of it being secured by a Reversed Angle Bracket to a $2\frac{1}{2}"$ Curved Strip 2, which is held in position by two Double Angle Brackets. The other ends of the Curved Strips are attached by two Angle Brackets to the bosses of two 1" Pulley Wheels locked on each end of the Rod 3.

The warp separating mechanism is

operated by turning a Crank Handle 4 journalled in the $12\frac{1}{2}"$ Strips of the base as shown. The Crank Handle is held in place by a Bush Wheel at one end and 1" Pulley at the other. A Driving Band connects this 1" Pulley with a second Pulley on the Rod 3.

Parts required to build model Loom: 2 of No. 1; 6 of No. 2; 2 of No. 3; 9 of No. 5; 4 of No. 10; 2 of No. 11; 2 of No. 12; 2 of No. 15b; 3 of No. 16; 2 of No. 17; 1 of No. 19g; 3 of No. 22; 1 of No. 24; 6 of No. 35; 38 of No. 37a; 40 of No. 37b; 6 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 2 of No. 125; 1 of No. 186; 2 of No. 187; 2 of No. 188; 2 of No. 189; 1 of No. 190; 1 of No. 213.

The roadway of the simple model bridge

shown in Fig. 2 is constructed by joining the ends of two compound girders, each comprising two $18\frac{1}{2}"$ Angle Girders overlapping two holes, by $4\frac{1}{2}"$ Strips. The space between the girders is filled by four $12\frac{1}{2}" \times 2\frac{1}{2}"$ and four $9\frac{1}{2}" \times 2\frac{1}{2}"$ Strip Plates.

The top of the main pier is formed by a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate, the sides of which are extended by a compound plate consisting of a $5\frac{1}{2}" \times 1\frac{1}{2}"$ and a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate. At the ends of the

Flanged Plate are two $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plates. The sides and ends of the pier are fastened together by two $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The base of the pier consists of a second $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate.

The girder work of the bridge is built up by bolting two $3\frac{1}{2}"$ Angle Girders to each end of the bridge. The upper ends of these Angle Girders are then joined to $3\frac{1}{2}"$ Strips by Curved Strips of various lengths.

The approach roadways are constructed as separate units and then fastened in position at each end of the bridge. Each unit consists of two $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates bolted together, overlapping one hole along their sides. The sides of the compound plate so formed are strengthened by two $5\frac{1}{2}"$ Angle Girders, the vertical flanges of which are connected by $2\frac{1}{2}"$

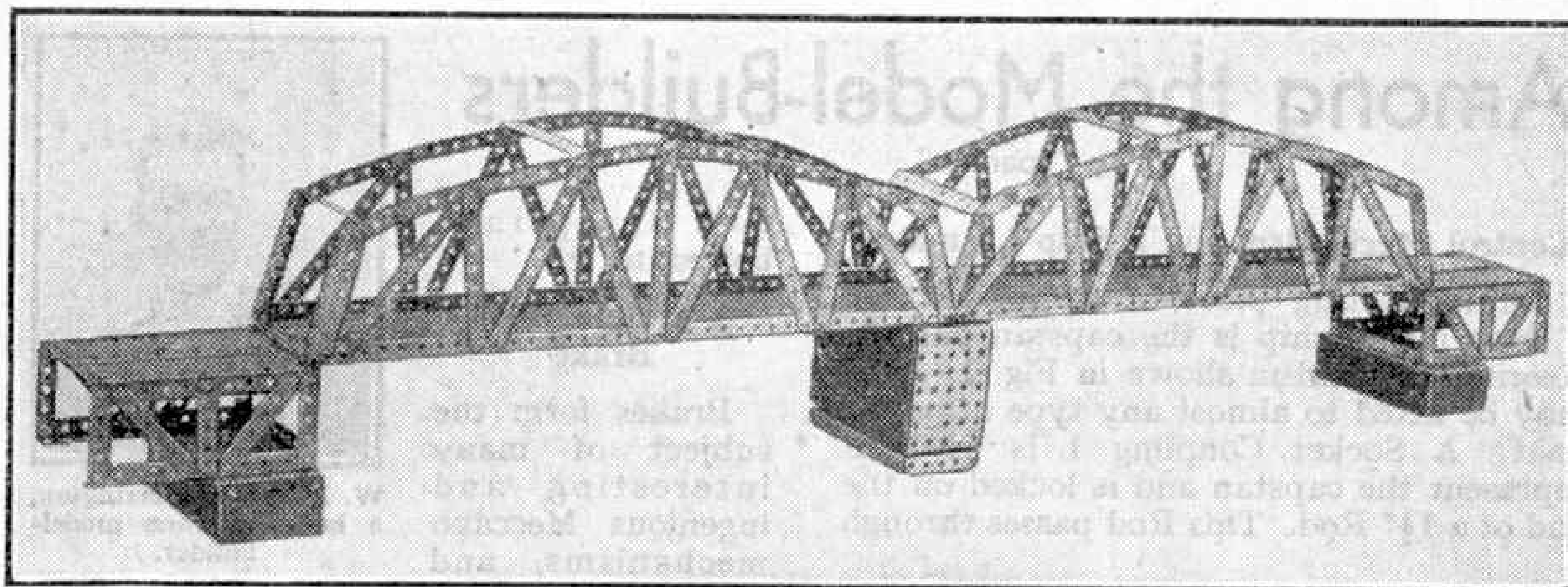


Fig. 2. A sturdy road bridge that is easy to construct.

and 3" Strips to two further $5\frac{1}{2}$ " Angle Girders. The latter Girders are bolted to the top of a small pier built up by extending the flanges of a $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate downwards by $5\frac{1}{2} \times 1\frac{1}{2}$ " and $2\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plates. When completed, the approach roadways are attached by Fishplates to the ends of the roadway of the bridge.

To complete the bridge the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate at the bottom of the pier is removed, and the pier and roadway can then be bolted together. The $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate is fixed in position again by fixing a bolt on the lower flange of each $3\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate by a nut. The $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate can then be fitted on the bolts and secured by further nuts.

Parts required to build model Bridge: 28 of No. 2; 10 of No. 2a; 4 of No. 3; 24 of No. 4; 12 of No. 5;

8 of No. 6a; 4 of No. 7a; 8 of No. 9; 4 of No. 9a; 4 of No. 9b; 2 of No. 48a; 8 of No. 48c; 4 of No. 52; 2 of No. 53; 4 of No. 89; 4 of No. 188; 6 of No. 189; 6 of No. 192; 4 of No. 196; 4 of No. 197.

Our last model is an amusing rocking horse, which is driven by a *Magic Motor* and rocks backward and forward when the Motor is set in motion. The model is shown in Fig. 3.

The body of the horse consists of a *Magic Motor* to which two $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips and a $2\frac{1}{2}$ " Strip are attached to form the two hind legs and one of the fore-legs. The second fore-leg is built up from two Fishplates, and is fastened to a lug of the *Magic Motor* by an Angle Bracket. Two $5\frac{1}{2}$ " Strips curved as shown are secured to the lower ends of the legs to form rockers.

Two Flat Trunnions placed together represent the horse's head, and its neck consists of two $2\frac{1}{2}$ " small radius Curved Strips.

The mechanism for rocking the model to and fro is very simple and consists of a $5\frac{1}{2}$ " Strip 2 loosely attached to one of the hind legs by a bolt held in place by two nuts. The Strip 2 is connected by means of a $2\frac{1}{2}$ " Strip 1 to a Bush Wheel fixed on the winding spindle of the *Magic Motor*. As the spindle of the Motor revolves, the Strip 2 is moved up and down so that the horse is first rocked backward as the Strip presses against the floor, and then forward under its own weight as the Strip rises. The Strips 1 and 2 are bent slightly so that they do not jam against any part of the model. The Bolts on Strip 1 are lock-nutted.

Parts required to build model Rocking-horse: 3 of No. 2; 4 of No. 5; 3 of No. 10; 3 of No. 12; 1 of No. 24; 21 of No. 37a; 16 of No. 37b; 2 of No. 48a; 2 of No. 90a; 2 of No. 111c; 2 of No. 126a; 1 *Magic Motor* (not included in Outfit No. 0).

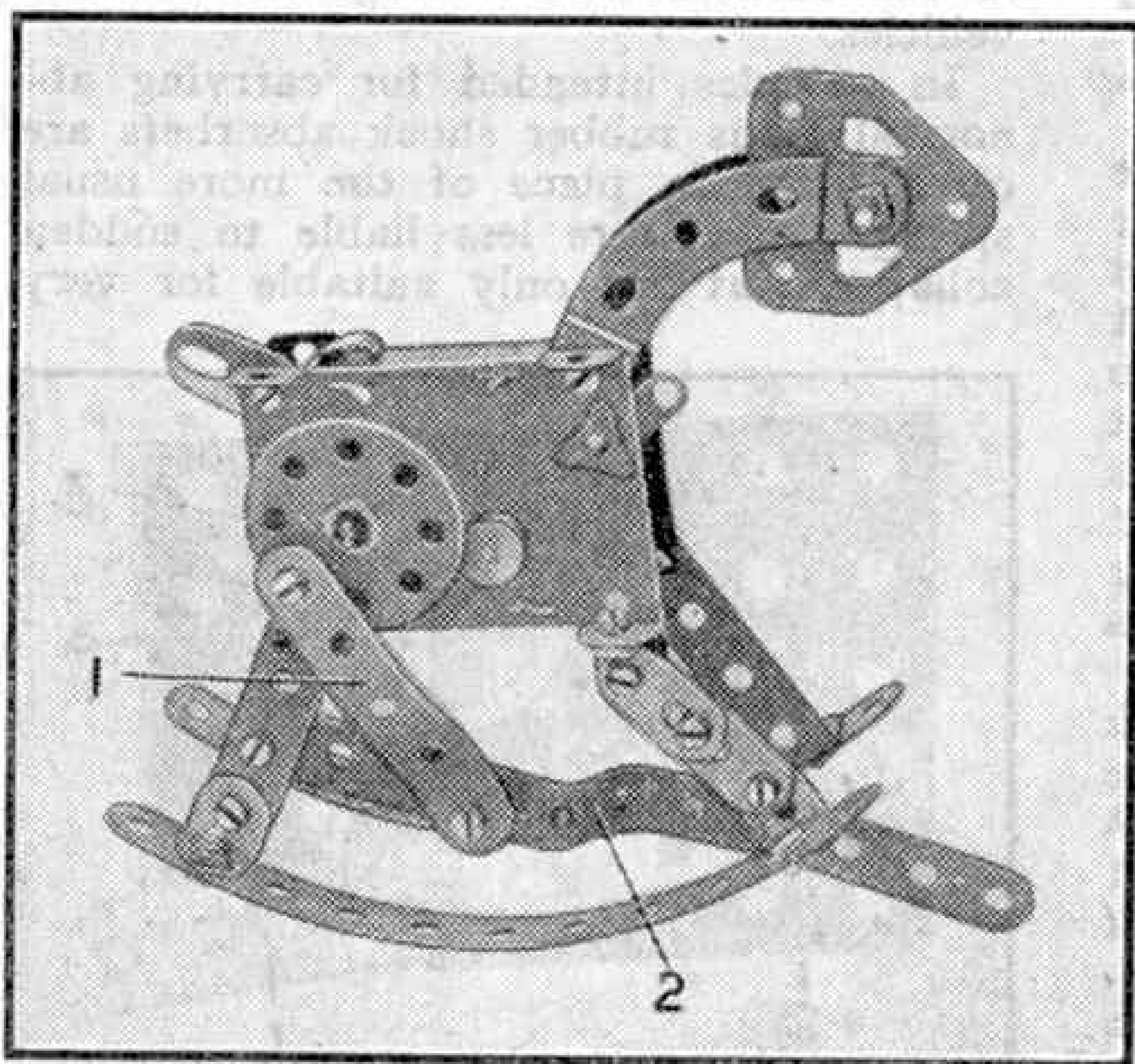


Fig. 3. When the *Magic Motor* of this rocking horse is started, the model rocks backward and forward.

Among the Model-Builders

By "Spanner"

Control Mechanism for a Ship's Rudder

An interesting piece of equipment for a large model ship is the capstan pattern steering mechanism shown in Fig. 1. This may be fitted to almost any type of power boat. A Socket Coupling 1 is used to represent the capstan and is locked on the end of a $1\frac{1}{2}$ " Rod. This Rod passes through

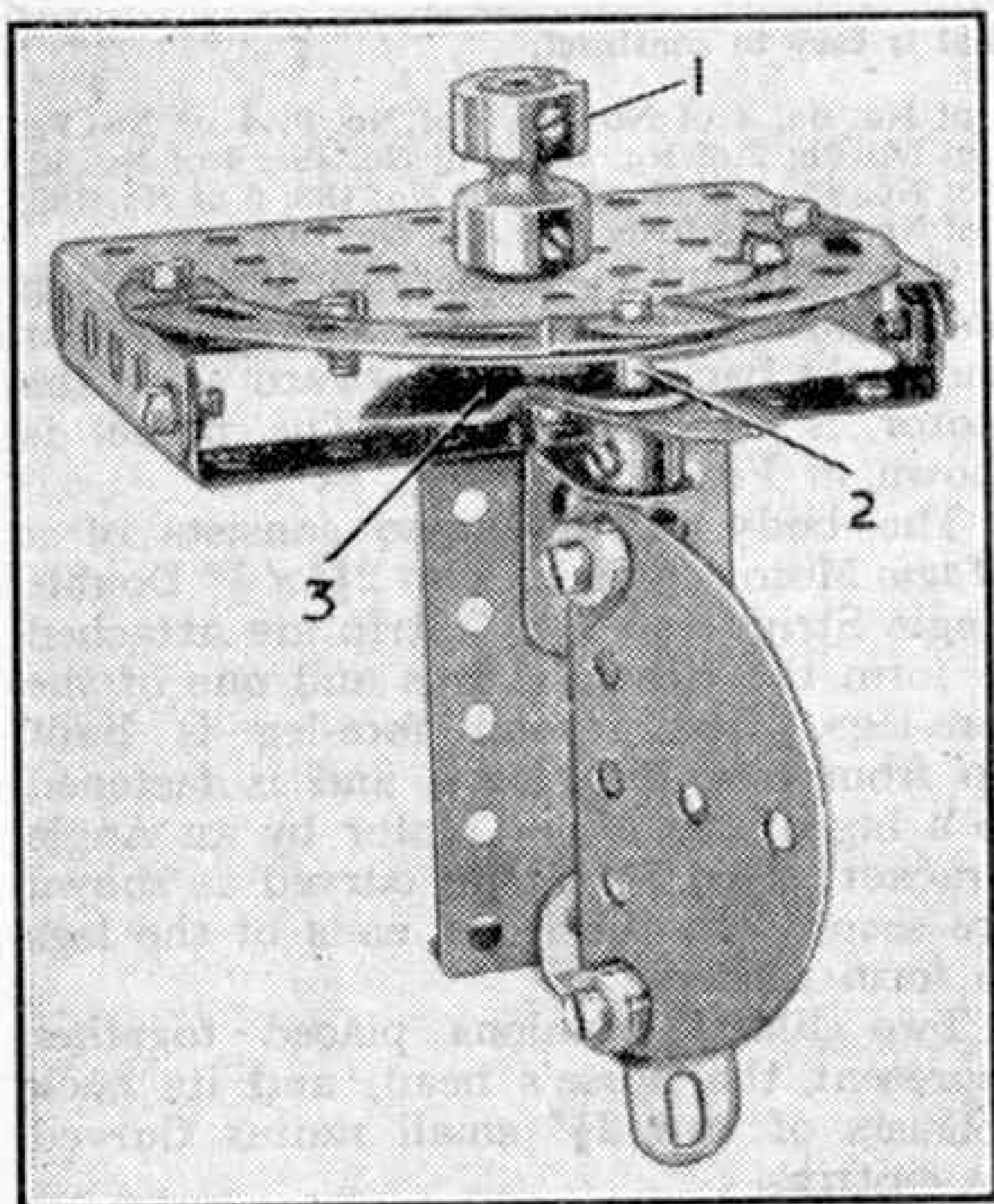


Fig. 1. A rudder control arrangement suitable for a large model liner.

a $3\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate representing the deck, and is kept in position by a 1" Gear Wheel, which is locked on the Rod so that it rotates with the Socket Coupling. A $3\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip is bolted to the flange of the $3\frac{1}{2} \times 2\frac{1}{2}$ " Plate and it carries a $2\frac{1}{2} \times 1\frac{1}{2}$ " Flanged Plate which is intended to represent the stern of a boat. A $3\frac{1}{2}$ " Rod 2, which is used as a rudder post, is journaled in Angle Brackets attached to the $2\frac{1}{2} \times 1\frac{1}{2}$ " Flanged Plate.

The top of the $5\frac{1}{2}$ " Rod 2 carries a Rack Segment 3, and this is arranged to engage the 1" Gear Wheel on the $1\frac{1}{2}$ " Rod. When the Socket Coupling 1 is rotated, it transmits the movement to the Rack Segment 3 through the 1" Gear Wheel. This in turn moves the rudder post which is represented in the model by a semi-circular Plate fixed to the rudder post by

two Couplings bolted to it.

A Simple Band Brake

Brakes form the subject of many interesting and ingenious Meccano mechanisms, and one of the simplest types is the elementary form of band brake, a Meccano version of which is shown in Fig. 2 on this page. In this example the brake lever consists of a $3\frac{1}{2}$ " Strip 1, pivotally attached at a suitable point on the frame of the model by means of a lock-nutted $\frac{1}{2}$ " Bolt 2. The driven shaft 4 is fitted at one end with a 1" fast Pulley 3 around which a short length of cord is passed. The two ends of this cord are secured to the brake lever at the points shown in the illustration.

If increased braking effect is desired a larger Pulley may be used in place of the 1" fast Pulley 3, the brake lever 1 being attached in a lower position if necessary. Alternatively a weight can be hung from the end of the brake lever.

Rubber Shock Absorbers for Road Vehicles

Fig. 3 shows an arrangement of rubber shock absorbers, which I am describing for the benefit of model-builders interested in the construction of large model road vehicles.

In vehicles intended for carrying abnormal loads rubber shock absorbers are often fitted in place of the more usual springs. They are less liable to sudden collapse, but are only suitable for very

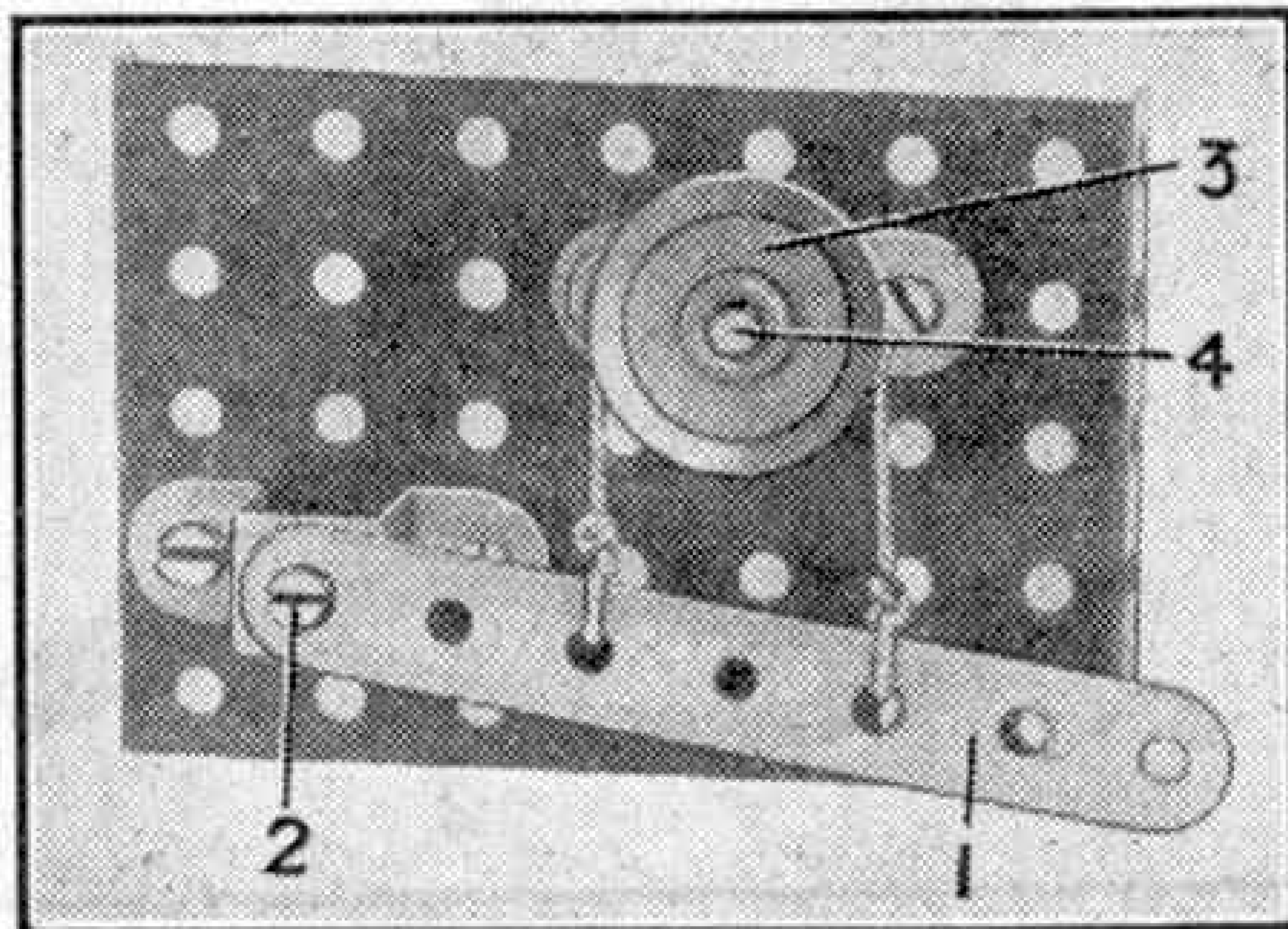


Fig. 2. A simple hand brake.



W. Biddulph, Derrington, a keen Meccano model-builder.

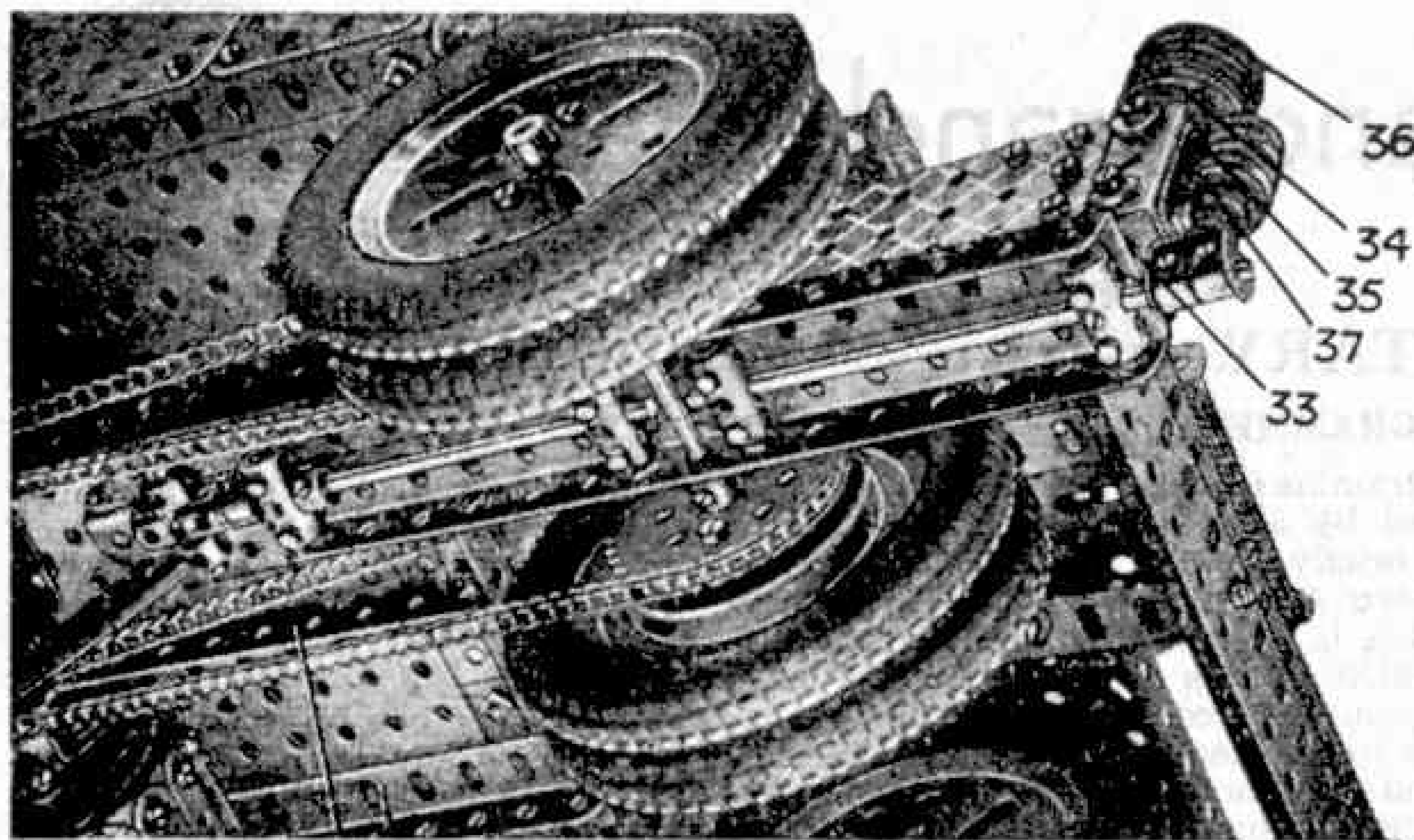


Fig. 3. Rubber shock absorber mechanism designed for heavy road vehicles.

slow moving vehicles as, except in very special circumstances, they are incapable of absorbing sudden shocks.

The arrangement shown in Fig. 3 is typical of that used in some of the world's largest vehicles. The set of rear wheels for one side of the lorry is carried on a Rod of suitable length journaled in a strong compensating beam, the forward end of which is pivotally attached to the underside of the main frame of the lorry so that it is capable of universal movement. The other end of the beam is fitted with a Large Fork Piece, and a Rod in the boss of this moves vertically in a set of $\frac{1}{2}$ " fast and loose Pulleys 37. The lower and upper Pulleys of this set are fixed to the main

frame by a $\frac{3}{8}$ " Bolt, and by the shank of a Handrail Support 35. The complete fitting represents the primary shock absorber of the actual lorry.

A 1" Rod, part of which is shown at 33, passes through the end hole of the bottom Girder of the lorry frame. The inner end of this Rod carries a Collar that is in contact with one end of a Single Bent Strip, the two opposite ends of which press against the bottom of a 1" fast Pulley 34. The Single Bent Strip is held by a $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle

Bracket and is free to slide, its ends passing the Handrail Support 35, one end on each side.

The Handrail Support is fitted with a 1" Threaded Rod, which passes through the boss of a 1" Pulley 34 and carries four Rubber Rings that are held in place by a second 1" fast Pulley 36, locked on the Threaded Rod by two grub-screws. As the beam carrying the road wheels rises, the Single Bent Strip presses against the underside of the Pulley 34. This action tends to compress the Rubber Rings, as they are prevented from moving vertically by the pulley 36 and its 1" Threaded Rod. A similar action could be arranged for the primary absorber.

More Prizes for Model-Builders

This month we are offering prizes consisting of cheques and postal orders in a competition in which Meccano models of any size and subject can be entered. The competition is open to readers of all ages.

The model itself is not required, all that should be sent being a photograph or drawing with any notes required to explain special constructional features. Each photograph or drawing must bear the competitor's name, address and age, and the entry should be forwarded to "*March Model-Building Contest, Meccano Limited, Binns Road, Liverpool 13.*"

Entries will be divided into two sections. A, for competitors of all ages living in the British Isles, B, for competitors of all ages living Overseas. Section A will close on 30th April next, but Section B will remain open for entries until 31st July.

The following prizes will be awarded in each Section of the Contest:

First, £2/2/-. Second and Third Prizes

will consist respectively of £1/1/- and 10/6. There will also be five further prizes of 5/-, and Certificates of Merit.

"Autumn" Model-Building Contest Results (Home Section)

1st Prize, Cheque for £2/2/-: L. Smith, Crosby, I.O.M.; 2nd, Cheque for £1/1/-: J. E. Matthews, Fillongley; 3rd, Postal Order for 10/6: A. Reeve, Melton Mowbray.

Consolation Prizes of Postal Orders for 5/-: J. Bradbury, Galmington; J. A. Kennett, Gerrards Cross; J. P. Moore, Birmingham 28; R. Gaffikin, Birkenhead; D. G. Christie, Manchester; G. Waller, Congleton; D. Farrall, Ellesmere Port; D. Ferrar, London, S.E.9; H. Baldwin, Blackburn; R. Giddings, Bury St. Edmunds.

"Puzzle Picture" Contest Results

1st, £2/2/-: A. Roberts, Ottawa; 2nd, £1/1/-: J. Hughes, Melbourne; 3rd, 10/6: L. Linder, Stockholm.



Club and Branch News



WITH THE SECRETARY

NOVELTIES IN THE CLUB PROGRAMME

"Salmagundi Evening," the new programme feature of the Maylands M.C., should be noted by all Club Leaders and officials. As explained briefly in the report of the proceedings of this Western Australian Club in last month's "M.M.," the idea is to form small groups of members, each of which spends a short time mastering some small point in constructional work under the guidance of a senior member. Each group then passes on to another instructor, and this goes on until each section has made the complete round of the instructors appointed for the purpose.

I like this idea. There are many small practical points in model-building and other hobbies that do not require much time to master, but are most readily and easily picked up from a demonstration of this kind.

RAILWAY FILMS

Those responsible for the programmes of both Clubs and Branches will be interested in railway lantern slides and films of which particulars have just reached me. These deal chiefly with interesting features of the territory of the railway company concerned. They are lent free of charge, and can be guaranteed to give very pleasant and instructive entertainment. It is a good plan to include the showing of slides or a film among the attractions of an open meeting at which parents and friends of members can be present.

A suitable projector is necessary, and Clubs and Branches that do not possess one should try to hire one for the occasion. The lantern slides are of standard size and the films are of the 16 mm. type. Good notice is required, and it is essential that slides or films shall be returned with the utmost promptitude after use.

Leaders and Chairmen who are interested should write to the following addresses in order to make the preliminary enquiries. On doing this they will be sent lists of the slides or films available, together with information on the conditions under which they are supplied; these of course must be strictly observed.

G.W.R.—The Publicity Office, G.W.R., Paddington Station, London W.2.

L.N.E.R.—The Press Relations Officer, L.N.E.R., Dorset Square, London N.W.1.

S.R.—The Public Relations and Advertising Officer, S.R., Waterloo Station, London S.E.1.

PROPOSED CLUBS

EDINBURGH—L. Ewart, 9, Sighthill Street, Edinburgh 11.

BACUP—R. A. Blackburn, 8, Heath Hill Drive, Stacksteads, Bacup, Lancs.

HOUNSLOW—D. A. Russell, 106, Hinton Avenue, Hounslow, Middlesex.

MANSFIELD—Mr. W. H. Stephenson, Easlin Farm Upper Langwith, Mansfield, Notts.

PROPOSED BRANCH

LONDON—Mr. P. J. Varley, 33, Woodbourne Avenue, Streatham, London S.W.16.



V. Chatburn is secretary of the Shawe-Hall (Flixton) Branch, No. 463, Chairman, Mr. T. V. Chatburn. Members have enjoyed operations on the Hornby Train layout at regular meetings since incorporation in May 1944.

CLUB NOTES

ST. QSWALDS M.C.—Hobbies Night, a Quiz and Model-building Nights have made up the programme. In the Quiz members were grouped in four sections in rivalry, and every member had a chance to gain a point for his team. Film Shows have been added to the programme. The boys in Queen Mary's Hospital for Children at Carshalton have been "adopted." They have been helped with model-building, books are being supplied to them and model-building sessions are being arranged for them. Club roll: 43. *Secretary:* D. R. C. Pavey, 37, Croft Road, Norbury, London S.W.16.

WHITGIFT SCHOOL M.C.—Meetings have been resumed after disturbances due to illness, etc. At one of these special attention was given to the running of Hornby Trains on the Club layout. The Library continues to be well used. Club roll: 40. *Secretary:* V. J. Legg, 312, Fir Tree Road, Epsom Downs, Surrey.

HORNSEA M.C.—Social Nights have included enjoyable Film Shows and Indoor Games, chiefly Darts. Practical meetings have been devoted to Book-binding, when the Club's copies of the "M.M." were bound, and Model-building. Lantern Lectures on "Great Explorers" and on various nature topics also have been given. Special Holiday Meetings were arranged in the early days of the year, the programme including Film Shows and Monopoly. Club roll: 54. *Secretary:* P. Hobson, 1, Marlborough Avenue, Hornsea.

AUSTRALIA

THEBARTON BOYS' TECHNICAL SCHOOL M.C.—The present session began with a Talk by Mr. E. S. H. Gibson, Leader, on the activities of the Club since its foundation. Models of traffic control lights and of a motor car engine have been explained with demonstrations. Visits have been paid to Railway Workshops, a Pipe Works and a Bakery. *Secretary:* B. Megaw, Thebarton Boys' Technical School, Thebarton, South Australia.

BRANCH NEWS

GOWERTON BOYS' GRAMMAR SCHOOL—A new Hornby Locomotive and Layout has been placed at the disposal of the Branch by Mr. Haines, Biology Master, who has also given a Lecture on the making of coal gas in preparation for a visit to the local Gas Works. A section for "Spotting" has been formed, and a central log book is being compiled. A Meccano Section also has been formed. *Secretary:* D. Walter, Leslie House, Culfor Road, Loughor, Swansea, Glam.

WIDNES AND DISTRICT—Outstanding events have included preparations for removal to new headquarters and the opening of a Railway Course for members. The idea of this is to provide up-to-date knowledge of British Railways. The Course has begun with Talks on the four main line railways. *Secretary:* R. Hindley, 146, Peelhouse Lane, Widnes.

PERSE SCHOOL—Lantern Lectures and Film Shows have been enjoyed, together with a party. A visit to the Romney, Hythe and Dymchurch Railway was an outstanding event. *Secretary:* D. Mann, 151, Shelford Road, Cambridge.

Engine Sheds On Hornby Railways

THE scarcity of Hornby Railway accessories is still as bad as ever and there is not much likelihood of any great improvement in the immediate future. Later in the year, however, it is hoped that there will be some change for the better. In the meantime we simply have to make the best use we can of the material already in our possession.

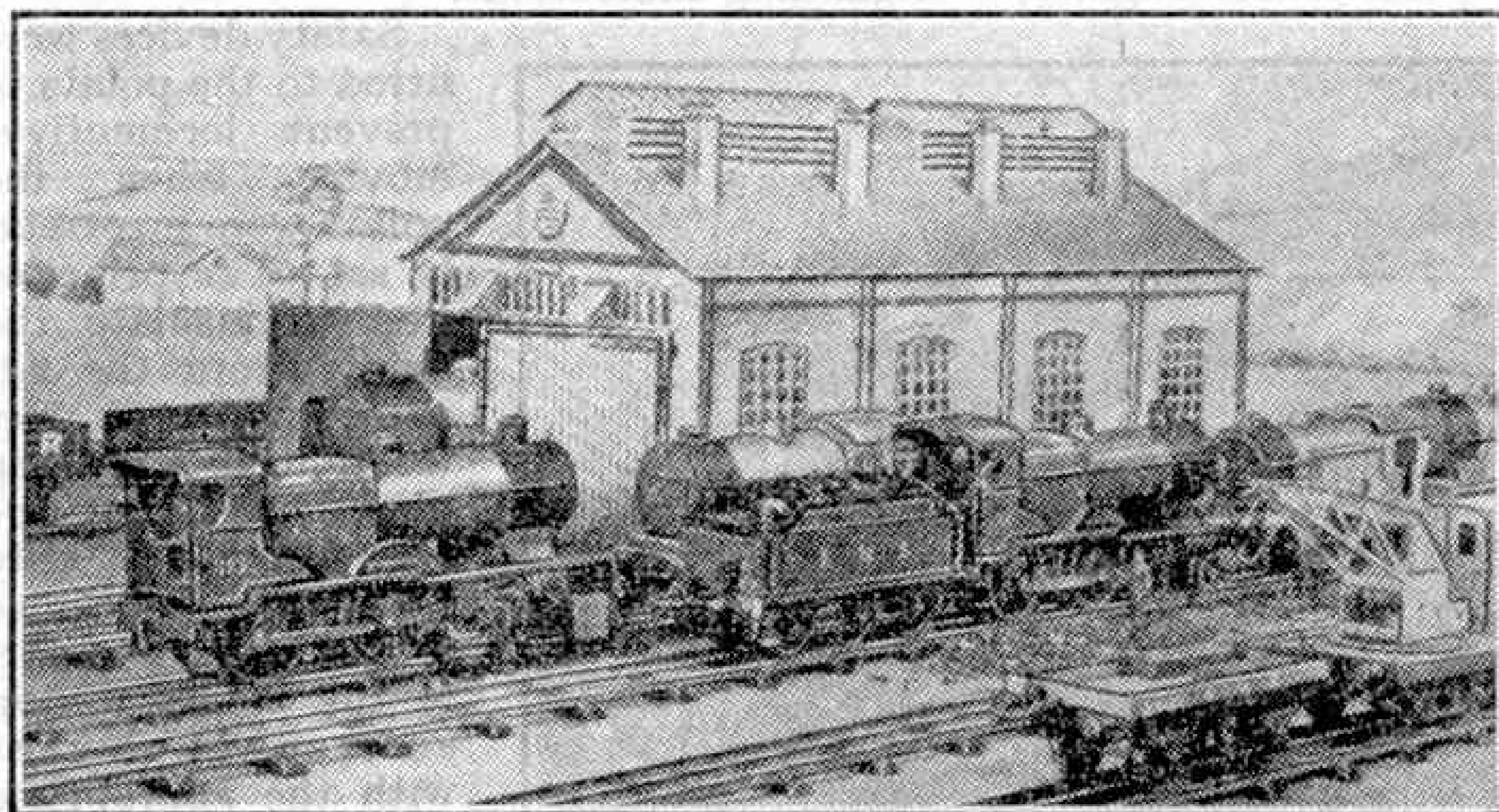
Recently several readers who are the fortunate owners of Hornby Engine Sheds, have written for advice on the best way of making use of these sheds in their

for more than one shed so that a more or less central situation is desirable. Some light engine running will be necessary to get the engines to and from their jobs, but this is usually enjoyed by the operators of miniature railways.

If the layout is small and the only station is of the usual roadside type, the Locomotive Department will probably be on a similarly reduced scale. The shed can still be placed near to the station, but the number of roads given over to "locomotive purposes" will be smaller;

one road for engines and possibly another one alongside for wagons of "Loco Coal."

Track arrangements leading to the engine shed depend largely on space but they should be such that engines can move freely on and off the shed premises without the incoming and the outgoing ones getting in each other's way. If the shed is used



The Engine Shed on a Hornby layout. The scene includes coal wagons, an engine "under repair" and part of the breakdown train.

limited space and with their comparatively small equipment in the way of track. In actual railway practice the locomotive depot is one of the most important and fascinating places to be found anywhere. It is here that the engines are housed, maintained and cleaned, as well as supplied with all their requirements in the way of coal, oil and water.

Real engine sheds are usually placed near the main line, often in the neighbourhood of an important station where the engines usually start or finish their proper work. Another possible location is at or near a large goods yard, the shed then usually accommodating the freight engines only.

It is difficult to recommend a definite site for the shed on a Hornby railway because the design of layouts and the space available vary so much. If the layout has a main line station, the shed may be placed near to it. Even on an extensive line there is not usually space

as a "through" one, that is where there is access to the shed at either end, then an ideal to aim at is to connect the tracks forming the engine yard to the main line at each end of the Locomotive Department premises. Possibly one-way locomotive movements may be adopted, the rule being that engines enter at one end only and always leave by the other. It is not always possible to follow up this idea, but miniature clockwork or electric engines do not have to carry out the sequence of preparation and disposal operations that the real steam ones do.

With a "dead-end" shed layout, that is one where entrance and exit take place at one end only, the "continuous" scheme of engine movement is not possible. In miniature, however, a little shunting about in the engine yard does not make a lot of difference to the operator, but careful planning may be necessary at busy times to keep the arriving and departing engines in the proper turn for their various duties.

A Jointly-Owned Hornby Railway

THE accompanying photographs show the Hornby electric railway operated by two of our readers, Mr. D. J. Muirhead and Mr. G. A. North, both of Hendon. The present system has developed through various stages since the owners first joined forces in 1934, each then possessing a simple Hornby goods train hauled by a clockwork 4-4-0 tender locomotive. A combined layout was put down on the floor of a spare bedroom. It consisted of an oval and a loop line with two three-road terminal stations led off from each end of the oval. Additional engines,

The main line was single, with a double track passing and return loop at "York." Various refinements included home-made colour light signals for main line work, with ordinary signals at the terminal stations operated by wire taken through flexible curtain rodding run beneath the baseboard. Press-button switches at each station switchboard lit up various coloured electric bulbs according to the class of train it was desired to send. At the same time a buzzer or bell operated to give audible as well as visible signalling indications.

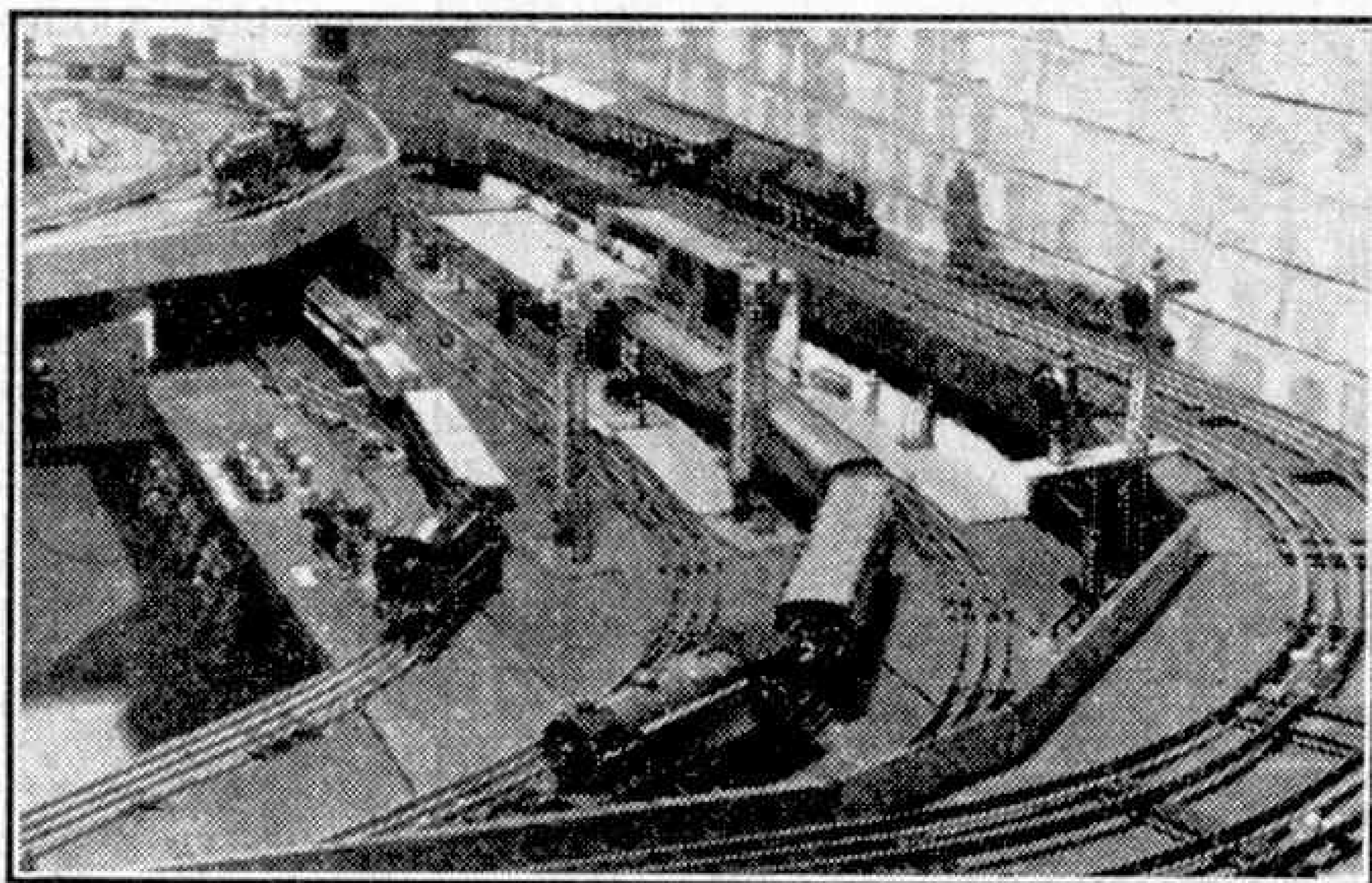
Safety devices were fitted to the points to prevent locomotives moving when the points were incorrectly set. The principle was to insulate the points from the adjoining track by wooden connecting pins, so that the current would only flow when the movable centre part of the points was in correct alignment with the appropriate sidings.

Both operators were in the Forces from 1939 to 1946 and the complete layout was stored,

but in May 1946 rebuilding commenced. The photographs reproduced here give some idea of its present scope.

The layout has now been expanded so that it has double track throughout, with four lines at the intermediate station, "York." Each terminal station has three passenger roads and two goods tracks. "Wembley" station is 2 ft. above floor level and the track gradually slopes through "York" to "Inverness" which makes about an inch drop in every 6 ft. of line, or a slope of 1 in 72 approximately.

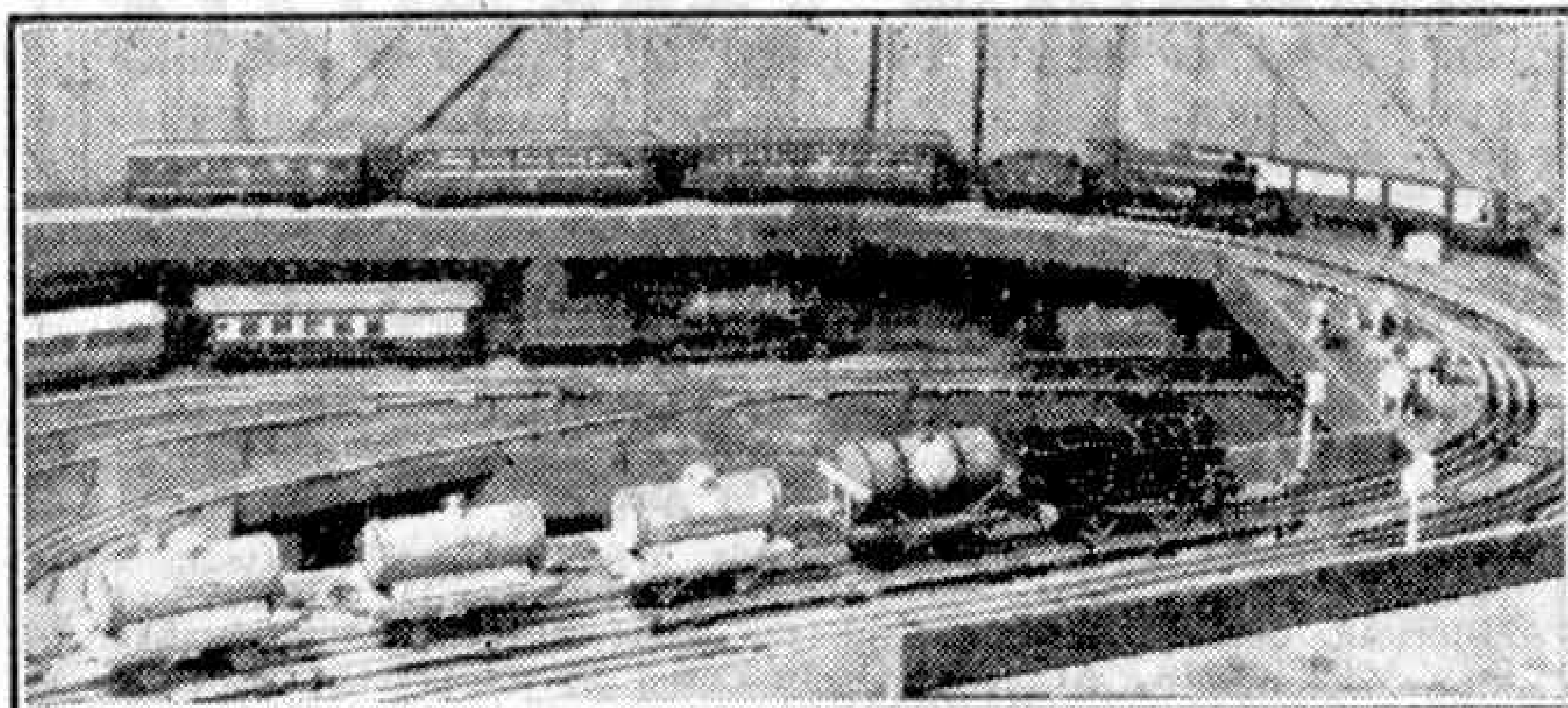
Rolling stock is all Hornby, and the chief motive power consists of two 4-4-0 tender engines. One of these is the L.N.E.R. "Bramham Moor," and the other is the L.M.S. Standard Compound. In addition there are two 4-4-2 and two 0-4-0 Tanks. Passenger trains are all made up in three-coach units and they include one



A view from above of "Inverness" on the layout of Mr. D. J. Muirhead and Mr. G. A. North, Hendon. The station has high level lines on each side of it.

coaches and goods rolling stock were added, and in 1936 it was decided to transfer the layout into the empty garage adjacent to the house. This was necessary to prevent the system from overflowing into the house!

The track was now mounted on a wooden base about a foot above the level of the concrete floor. From this time onward the layout became an imaginary L.M.S. and L.N.E.R. Joint railway between two terminal stations named respectively "Wembley" and "Inverness," with one intermediate through station, "York." During 1936 to 1939 the layout was completely electrified with a 20-volt transformer for each of the two operators, one at each terminal station. Sidings at the stations and the main line were broken up into sections under separate switches to allow the use of five locomotives.



Both track levels are shown in this illustration. A tank wagon train and passenger trains also appear.

L.N.E.R. Corridor bogie set, one L.M.S. Corridor bogie set and two suburban sets, one L.M.S. and one L.N.E.R. respectively.

Goods trains include a complete train of tank wagons. These are the standard Hornby vehicles and provide mostly for petrol and oil traffic, although there is a bitumen tank wagon in the "rake" or formation. Another complete train is for timber and includes both bogie and four-wheeled timber and lumber wagons, suitably loaded with miniature boards, poles and tree trunks. Part of this train can be seen in the illustration on the previous page; in fact, each of the goods trains can be discerned in one or other of the photographs.

A special feature is made of the handling of perishable traffic and so there is a set of suitable vans representing a "fitted freight" or express goods train that in actual practice is made up of vehicles provided with automatic brakes. Another freight traffic assembly is a "mixed goods" of varied wagons and vans suitable for either through running or roadside work at intermediate stations. This completes the traffic working units but there is also a formation representing a breakdown train. The chief item in this is the familiar Hornby Breakdown Van and Crane. Each of the freight trains has its own brake van and the number of vehicles varies from four to seven, according to their type, whether bogie

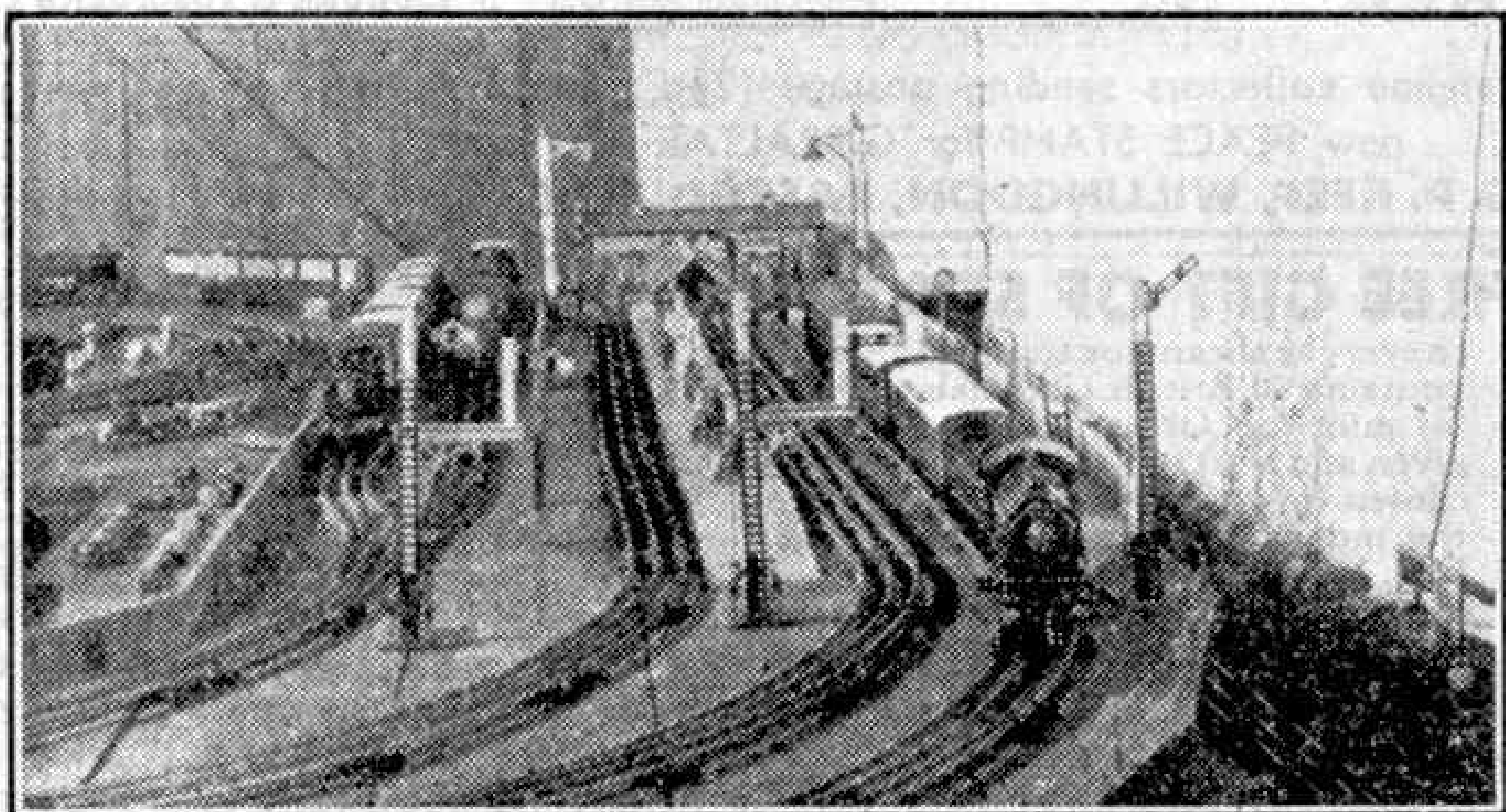
or four-wheeled.

The guiding operating principle on the layout is to keep the passenger and goods vehicles in sets in order to reduce shunting and so allow a greater service frequency. This limited load idea has a great deal to commend it in model working. On this layout, the fixing of loading standards for the different types

of engines has the result that no trouble is experienced with haulage on the up gradients, one passenger set or two sets of freight wagons being the weight limit for any one engine.

The layout represents both an imaginary long-distance main line and a short-distance suburban line operated as it were at one and the same time. The "*Flying Scotsman*" and the "*Royal Scot*" trains are incorporated in the timetables and look most impressive.

Each of the terminal stations has a switchboard incorporating a transformer, circuit breaker and eight section switches. Signalling at "*Wembley*" is with upper-quadrant signals operated by wire from the switchboard and at "*Inverness*" with lower-quadrant signals. Colour-light signals control the main line. Improvements envisaged in the future include provision of an engine shed and turntable, automatic colour-light signals controlled by the passing of individual trains and an extension into the garden.



A realistic scene at "Wembley" with its three platform roads, and two sidings for goods traffic.

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Stamp Collecting

"Star and Key of the Indian Ocean"

By F. Riley, B.Sc.

OUR last call in our Empire stamp tour was made in Australia, which we had reached after a rapid circuit of the South Seas, and now we return towards South Africa. Before reaching that continent, however, we must go a little out of our way to visit Mauritius, an island 600 miles or so to the east of

Madagascar. The island itself and its stamp story have many remarkable features of interest.

Mauritius was first visited by the Portuguese more than four centuries ago when they explored the sea route round South Africa to the East Indies. They found it uninhabited, and as far as they could see there had never been any living people on it. They did find one

strange

creature of interest in the dodo, a bird that now shares with Queen Anne the privilege of representing the very last word in deadness. The dodo was a helpless bird. Its wings had grown too small to enable it to fly, and in the course of its evolution it had not developed the long legs of the emu or the ostrich. The result was that it was easy prey for the Portuguese, and for the Dutch who followed them in the succeeding century, while it had no defence against the animals that the European visitors brought with them. Before long its ungainly waddling body was no longer seen anywhere in the island, and the bird is now extinct.

Neither the Portuguese nor the Dutch made any real settlement in Mauritius, and it was left to the French to transform it into a prosperous and charming island. They retained possession for about 100 years. It fell to the British in the Napoleonic wars, and it has remained British ever since.

Mauritius has furnished one of the world's greatest stamp romances. This concerns the famous "Post Office" issue of 1847. In this there were two stamps, a 1d. red and a 2d. blue, and only 500 specimens of each were actually printed. Many of them were used in sending out invitations to a ball held by the wife of the governor, and today only 13 copies of the 1d. and 12 of the 2d. are known to exist. The result is that on the rare occasions when specimens are for sale they bring very high prices indeed.

The first examples of these stamps that became known to collectors were discovered at Bordeaux, in France. Other specimens have turned up from time to time in unexpected places. For instance a very fine example of the 2d. stamp came to light in a small collection in London



early in the present century. It had been given to the owner when he was at school some 40 years earlier, and he had kept it with his other

stamps in a pocket book. This example realised £1,050 when sold by auction and it went into the Royal collection, which also includes a very fine 1d. Mauritius "Post Office" on an envelope.

These early stamps carried a portrait of Queen Victoria, with simple lettering, and they were followed by stamps similar in style that to-day are not so rare as the 1847 issue, but nevertheless are distinctly valuable. Fortunately the remaining stamps of the island are much more easily obtainable, and they form a very interesting study. Portrait stamps have predominated, but the island also has produced a very interesting series of "Arms" stamps, beginning with the issue of 1895. On this the

quarters of the shield show respectively, a three-masted sailing ship, three branches of sugar cane, a key and a star. The key and the star are mentioned in the motto *Stella clavisque Maris Indici*, which means "Star and Key of the Indian Ocean." This motto did not appear on the 1895 stamps, but along with a smaller reproduction of the arms it figured on the Diamond Jubilee issue of 1898, reproduced on this page.

The arms of the island did not receive official recognition by Royal Warrant until 1906, and then there were changes. The three-masted sailing ship gave way to a galley, the three branches of sugar cane were replaced by palm trees, and the key had its ward turned to the right instead of to the left. These changes were made

in subsequent "Arms" stamps.

There is one other stamp of Mauritius that calls for special mention. This is a 15 c. value issued in December 1899 to celebrate the bi-centenary of the birth of Admiral Mahé de La Bourdonnais. La Bourdonnais was a man of outstanding talents who was born at St. Malo on 11th February 1699 and entered the service of the French East India Com-

pany in 1718. He rose rapidly to the command of a vessel, and in 1724 he behaved so gallantly at the capture of Mahé, on the Malabar coast of India, that he was given permission to add the name of that town to his own. He became governor of Mauritius in 1734. There he made roads, built forts and cleared considerable portions of the forests then covering the island, besides founding Port Louis, the capital. He promoted the planting and cutting of indigo and he it was who introduced the sugar cane, upon which the later prosperity of the island was founded. His great achievements richly merited remembrance by the issue of this commemorative stamp, and it is sad to think that on his return to France they did not save him from secret imprisonment for two years in the Bastille on a charge of maladministration. He was acquitted later when brought to trial on this charge.





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Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

COLLECTORS of British Commonwealth stamps are having a grand time just now with the "Victory" and "Royal Visit" issues, not to mention the various new values that are being issued to cover the changing postal rates. One of the last named has arrived too late to be used for the purpose for which it was obviously intended. We refer

to the new 1/3 stamp of Falkland Islands, which we are illustrating this month. It was placed on sale in January, just after air mail



rates had been reduced. The cost of sending a letter under half an ounce to the Falkland Islands had hitherto been 1/3, and hence the stamp. But the cost now is only 1/-. This doesn't mean that the new stamp cannot be used; it will still need 1/3 to send an air-letter by registered post, but only a small percentage of letters are registered.

Gambia only recently brought out a 1/3 stamp, and other countries with a stamp of the same face value are Gold Coast, Nigeria and Sierra Leone. Used stamps have not been very scarce, for there is a good deal of commercial correspondence between the West Coast of Africa and Great Britain, but the air mail rate for all these countries has now been reduced from 1/3 to 1/-, so used copies will be much scarcer in future.

As far as Gambia is concerned used copies of the new 1/3 stamp will probably never get plentiful, though it is probable that the Post Office will continue to stock the stamp, as has happened with the 5d. value. It is said that it is not easy to get this stamp in any of the post offices of Gambia, and apparently it covers no particular postal rate, yet new printings continue to be made, presumably to meet the needs of stamp collectors.

Of course post offices are only too pleased to sell stamps to collectors; as a matter of fact this is about the only use some of the stamps from our smaller colonies have, and most of this changing of colours and new values, etc., is only to provide new wares for philatelists. That being the case it is a pity that some care is not taken to provide stamps in the condition in which collectors want them. Nobody can claim that the recent Crown Colony "Victory" stamps, in the main, were bought by anybody but collectors, or produced for anybody but collectors for that matter; yet the centering of many of these stamps was simply appalling and the poor stamp dealer has had a very hard time of it trying to placate his customers. Other colonial stamps recently produced have not been much better.



One of the stamp trade papers recently mentioned how the sale of modern Europeans had gone off, owing to the vast numbers which have been issued. We have been foretelling this for some time. It was bound to happen, for collectors simply cannot keep up, but it's an ill wind that doesn't do somebody some good and our own colonial stamps have been the gainer. Collectors who are leaving modern "foreigners" are taking up KG VI issues, and they couldn't do better, for these stamps have real worth behind them.

When KG VI stamps were being used for barter with United States dealers it was feared that the American market would be flooded, but nothing of the kind has happened. The stamps were bought by collectors, and not only do they want to buy the obsolete values, but other collectors want to follow their friends' lead, so that U.S. dealers are having to import more than ever to satisfy the demand. Prices have zoomed in consequence. A couple of years ago obsolete KG VI stamps could be bought in the States, when found, at prices very much lower than those prevailing here. We recently noted a special offer in an American magazine of certain obsolete stamps and the cost was £30. The same stamps could be bought over here at £16.

A new racket has been introduced by certain governments to exploit collectors' weaknesses. Hard put to it to find new reasons for issuing stamps, they have hit on the plan to trade on the popularity of the late President Roosevelt and are all tumbling over one another to issue stamps in his "honour." Monaco of course had to have a set, and we are illustrating one of the nine just issued there.

Portugal also has been stepping up stamp production. Besides a set of eight depicting various castles, another set of four values has been issued commemorating the tercentenary of the "Patroness." One of these we are illustrating at the head of this column,

chiefly to show the beautiful design.

And what gossip on new issues would be complete without mention of Egypt's last commemorative set? This series of seven values was in rather short supply, but sets can be obtained now for a couple of shillings or so, and we feel like tipping them as the best thing of the month. Egypt has been emitting a lot of stamps recently, rather overdoing it in fact; and this coupled with the fear of some collectors that Egypt may be removed from the colonial section of Gibbons' catalogue means a rather heavy market for Egyptian stamps.

These stamps will again become popular when present fears are proved to be groundless, as we know they will.

It is some time since we have been able to illustrate a new U.S.A. stamp but we hear that several are under consideration.



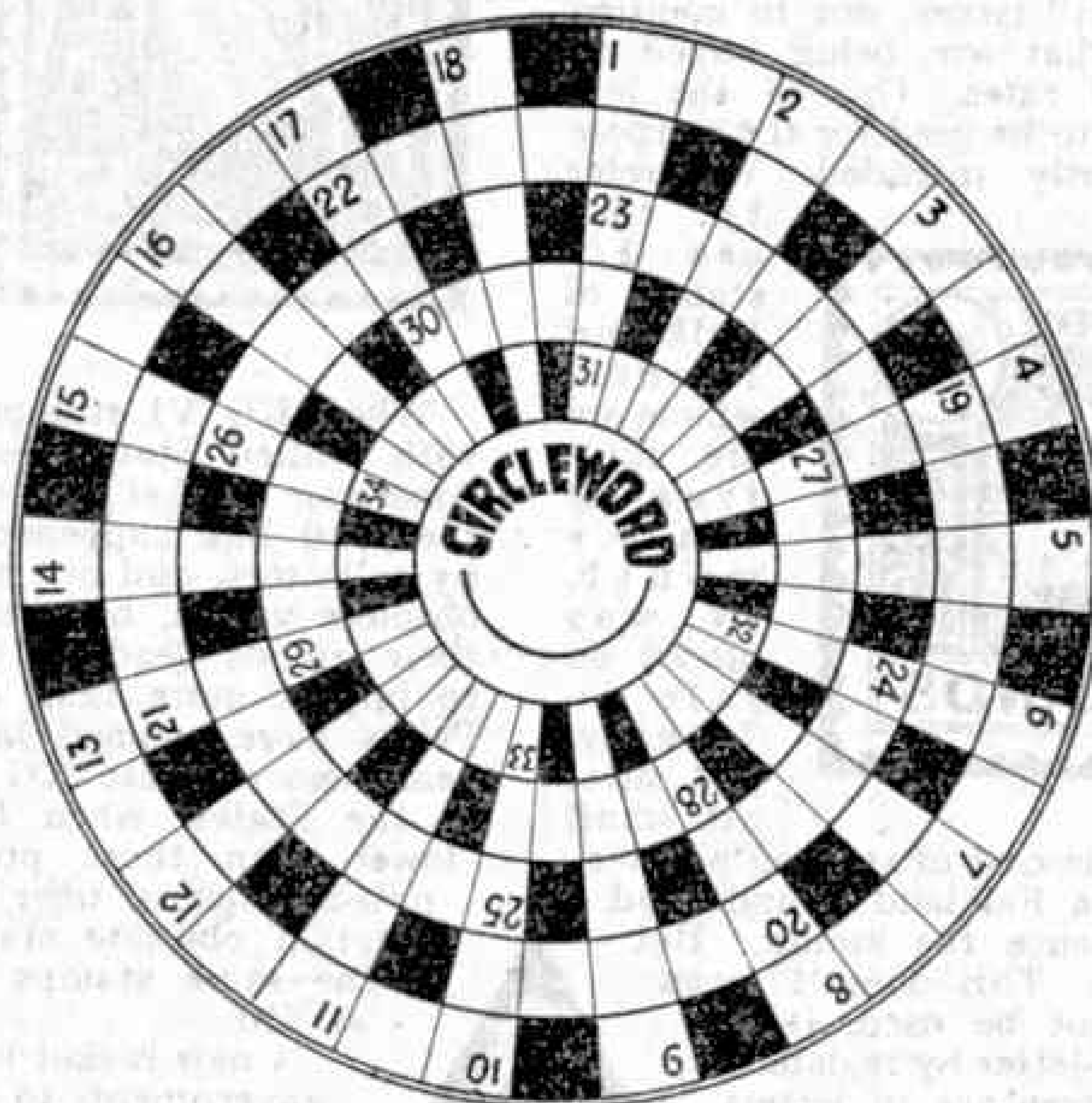
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A Novel Crossword Puzzle

CLUES AROUND

1. Sleep
6. Partial darkness
10. Warrior
15. Gives light
19. Swiftly
20. Nautical
21. Foe
22. Precise
23. Beseech
24. Go to see
25. Strive to equa
26. Coins
27. Dodge
28. Wander
29. Shelf
30. Fashion
31. Connected
32. Unpleasant
33. Tones down
34. Roofing material



CLUES RADIAL

1. Guide
2. Up to
3. Animal cry
4. Scolded
5. Heathen
6. Number
7. Animals
8. Going in
9. Happening
10. Runs away
11. Churlish
12. Craft
13. Staggers
14. Goes ahead
15. Used by printers
16. Rare animal
17. Old-time steward
18. Happy sound

"Circleword" is the name chosen for this month's puzzle, contributed by our reader T. K. Chaplin. It is really a form of crossword puzzle, the shape of which introduces a little variety. As with an ordinary square crossword puzzle, clues are given to the words that form the solution, but in place of the usual "Across" and "Down," we have "Around" and "Radial." The "Arounds" need no explanation; the "Radials" lead towards the centre of the circle. As usual in "M.M." contests of this type, the clues are all straightforward and the words to which they point are ordinary ones that can be found in Chambers

or any other standard dictionary.

There are two sections in the competition, for Home and Overseas readers respectively, and in each prizes of 21/-, 15/- and 10/6 will be awarded for the best solutions in order of merit. If necessary the judges will take neatness and novelty into consideration. Entries should be addressed "December Circleword, Meccano Magazine, Binns Road, Liverpool 13." Closing dates: Home Section, 30th April; Overseas Section, 31st October.

Do not cut out the diagram on this page. Make a copy of it for your entry.

Special Railway Wagon Contest

Most readers will be familiar with privately-owned wagons for the conveyance of certain kinds of traffic, mainly coal or coke, examples of which can generally be "spotted" in any goods or coal yard. Nowadays, as a result of pooling, many of these can be seen hundreds of miles from their "home towns." Below appear the jumbled names of a selection of them, and readers are invited to sort these out.

Here is an example to make matters clear. The first jumble is "EABLGNIQ," and after a little rearrangement of the letters this is seen to represent "BALGONIE." Only the main lettering is used; such words as "Ltd.," "Coy.," "Colliery," and so on are left out.

The jumbled names are as follows: EABLGNIQ; NFIAELRNF; NDTUONKRE; GGNEILD; DHOAOUWNHC; NWOILS NILE; YLLOECGHL; YAENLS LALH; NSOUTT HHTAE; SPRINOEB; NMROED TTRROANPS; AMROI; NHOULT; NDOUTT YMEASS; THSRU NNOESL; and DFOLOEWTE HFSI.

Entries must be addressed "March Wagons Contest, Meccano Magazine, Binns Road, Liverpool 13," and

posted to reach this office by 30th April, in the Home Section, and 31st October for Overseas readers. In each of the two sections, Home and Overseas, there will be prizes of 21/-, 15/- and 10/6 for the best entries in order of merit, with consolation prizes for other good efforts. If there is a tie for any prize the judges will decide on the novelty and neatness of the entries concerned.

March Photographic Contest

This month's photographic contest is the 3rd of our 1947 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "March Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers, and in each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 31st March; Overseas Section, 31st August.

Competition Results and Solutions

HOME

JUNE 1946 CODE PUZZLE CONTEST

1st Prize: J. Watson, Northallerton. 2nd Prize: T. Hill, Bolton. 3rd Prize: R. L. Lees, Wellington College. Consolation Prizes: K. H. Wollaston, Sale; D. B. Fry, Mold; T. D. Tasker, Barnsley; A. H. Cleaver, Rugby; H. Hayward, Bishops Cleeve; K. S. McGregor, Dundee; D. G. Jones, Aberystwyth; P. Freeman, Bletchley; G. Roberts, Liverpool 11.

JUNE 1946 STATION NAMES CONTEST

1st Prize: J. B. White, Northwood. 2nd Prize: P. Smith, Birmingham 17. 3rd Prize: G. Roberts, Liverpool 11. Consolation Prizes: N. McKenzie, Edinburgh; T. D. Tasker, Barnsley; G. C. Garner, Harrow Weald; F. Leach, Hooton.

JUNE 1946 PHOTOGRAPHIC CONTEST

1st Prize, Section A: Miss P. Bee, Brighton; Section B: J. Sagar, Blackpool. 2nd Prize, Section A: E. M. Patterson, West Kilbride; Section B: N. Boyd-Maunsell, Oxford. Consolation Prizes: C. S. MacDonald, Huddersfield; E. E. Barnes, Wembley Park; F. Barr, Birkenhead; G. R. Brown, Hove 4; W. J. Wren, Guildford.

JULY 1946 HIDDEN ENGINES CONTEST

1st Prize: J. T. Budden, Coulsdon. 2nd Prize: J. C. Buchanan, Cheltenham. 3rd Prize: B. Carter, Shipley. Consolation Prizes: A. P. Miller, Totnes; R. J. Perrin, Ilford; R. H. Brown, Wallington; R. Eckersley, Ashby-de-la-Zouch; F. Mills, Kearsley.

JULY 1946 CROSSWORD PUZZLE CONTEST

1st Prize: P. Ward, Rugby. 2nd Prize: G. Taylor, Chaddesden. 3rd Prize: T. Hill, Bolton. Consolation Prizes: H. J. Collier, Leeds 12; A. H. Cleaver, Rugby; N. B. Heathcote, Wolverhampton; M. Skelding, Birmingham; A. Elvey, London S.E.9.

JULY 1946 PHOTOGRAPHIC CONTEST

1st Prize, Section A: E. M. Patterson, West Kilbride; Section B: G. R. Brown, Hove 4. 2nd Prize, Section A: W. V. Salt, Newcastle; Section B: P. Duffy, Portumna. Consolation Prizes: F. Barr, Birkenhead; P. Duck, Tilehurst; N. Boyd Maunsell, Oxford; W. J. Wren, Guildford; J. B. Nurdin, Rayleigh; J. A. Fitchett, Farnworth.

AUGUST 1946 PHOTOGRAPHIC CONTEST

1st Prize, Section A: W. Barr, Birkenhead; Section B: G. R. Brown, Hove 4. 2nd Prize, Section A: W. C. Brown, Hove 4; Section B: A. L. Yettram, Dublin. Consolation Prizes: D. J. Jones, Wednesbury; I. T. Wood, Birmingham 28; R. Wrigley, Clitheroe; B. Chulindra, Helland Bridge.

AUGUST 1946 RAILWAY "QUIZ"

1st Prize: B. J. Holden, Burgess Hill. 2nd Prize: D. J. D. Gilbert, Bromley. 3rd Prize: C. E. Wrayford, Bovey Tracey. Consolation Prizes: J. B. Pickering, London N.9; J. M. Wagstaff, Coulsdon; D. Littlewood, Huddersfield; F. Mills, Kearsley.

OVERSEAS

APRIL 1946 DRAWING CONTEST

1st Prize: F. R. Bosselman, Wanganui East, N.Z. 2nd Prize: S. F. Noble, Invercargill, N.Z. 3rd Prize: G. T. Dey, Hamilton, N.Z. Consolation Prize: D. Willis, Waikato, N.Z.

MAY 1946 FIGUREWORD CONTEST

1st Prize: R. R. Williams, Concordia, Argentina. 2nd Prize: D. J. White, St. Albans, N.Z. 3rd Prize: A. Pouillard, Curepipe, Mauritius. Consolation Prizes: C. J. Frost, Pretoria, S.A.; V. A. Jibidar, Accra, B.W.A.

MAY 1946 LOCOMOTIVE CONTEST

1st Prize: B. L. Cottrell, Paris, France. 2nd Prize: J. Hewitt, Valletta, Malta, G.C. 3rd Prize: F. H. Tudor, Valparaiso, Chile. Consolation Prizes: J. T. B. Johnstone, Wellington, C.1, N.Z.; Pablo Giese, Buenos Aires, Argentina.

SOLUTIONS

JUNE 1946 CODE COMPETITION

Fishermen are to be found on quiet stretches of water and can often be included in the scene as a means of adding interest. See that the exposure is made when they are intent upon their pastime.

JUNE 1946 STATION NAMES CONTEST

1. Pontypool Road, G.W.R. 2. Bradford-on-Avon, G.W.R. 3. Virginia Water, S.R. 4. Kirkby Stephen, L.N.E.R. 5. Peebles, L.M.S.R. 6. Filton Junction, G.W.R. 7. Golden Grove, L.M.S. 8. Burnham-on-Sea, L.M.S.R. (S. & D. Jt.). 9. Leighton Buzzard, L.M.S.R. 10. Maiden Newton, G.W.R. 11. Abbey Wood, S.R. 12. Pembroke Dock, G.W.R. 13. Whyteleafe, S.R. 14. West Allerton, L.M.S.R. 15. New Holland, L.N.E.R. 16. Buckhurst Hill, L.N.E.R. 17. Shepton Mallet, L.M.S.R. 18. Keinton Mandeville, G.W.R. 19. Patney and Chirton, G.W.R. 20. Saffron Walden, L.N.E.R.

JULY 1946 HIDDEN ENGINES CONTEST

1. 5641, "Sandwich," 5XP Class 4-6-0, L.M.S. 2. 5658, "Keyes," 5XP Class 4-6-0, L.M.S. 3. 5679, "Armada," 5XP Class 4-6-0, L.M.S. 4. 5691, "Orion," 5XP Class 4-6-0, L.M.S. 5. 5706, "Express," 5XP Class 4-6-0, L.M.S. 6. 25297, "Sirocco," 3P Class 4-4-0, L.M.S. "Precursor." 7. 25673, "Lusitania," 4P Class 4-6-0, L.M.S. "Prince of Wales." 8. 3291, "Thames," "Duke" Class 4-4-0, G.W.R. 9. 5069, "Isambard Kingdom Brunel," "Castle" Class 4-6-0, G.W.R. 10. 5082, "Swordfish," "Castle" Class 4-6-0, G.W.R. 11. 359, "Hilda," 0-6-0 Tank, G.W.R. 12. 48, "Doncaster," A10 Class 4-6-2, L.N.E.R. 13. 2418, "The Pirate," D30 Class 4-4-0, L.N.E.R. 14. 100, "Spearhead," A3 Class 4-6-2, L.N.E.R. 15. 17, "Seaview," O2 Class 0-4-4 Tank, S.R. 16. 933, "Sevenoaks," "Schools" Class 4-4-0, S.R. 17. 909, "St. Paul's," "Schools" Class 4-4-0, S.R. 18. 21C5, "Canadian Pacific," "Merchant Navy" 4-6-2, S.R.

JULY 1946 CROSSWORD PUZZLE



Model Making in Switzerland—*(Continued from page 112)*

Baden Bakers, being a special kind of small cakes. At the end of the 18th century the "Spanisch Brotli" used to be served at the breakfast table of the old aristocratic families in Zurich. Till the opening of the Baden-Zurich Railway, the servants of the rich families had to walk during the night to Baden where the "Brotlis" were ready to be sold at 4 a.m. and then they had to walk back to Zurich, which meant some four hours on the road each way in order to arrive in time for breakfast in Zurich. Thus, after the opening of the railway, the "Spanisch Brotli" were sent by the first train. Although these delicacies are no more known in Switzerland, the nickname of the "Cake Train" still remains. When the line first opened the rolling stock consisted of four locomotives of the American type, built in Germany by the firm of Emil Kessler, Karlsruhe, 30 passenger coaches and 10 wagons of different types, supplied by Schnieder and Mayer of Karlsruhe.

Also included in the Exhibition are to be five complete model trains to a scale of 1:10, to show various time periods in the history of the Swiss Federal Railways; and these are all being made by various model makers of the Swiss Clubs.

With the appeal that Switzerland now and always has offered to the tourist, this additional attraction will draw even more travellers to this beautiful country, especially those interested in railways and model railways.

About Air Inventions—*(Continued from page 99)*

the rudder, which connection was the essence of their patent. Then R.E.P., as he was always called, claimed that his stick control covered all possible forms of control, and threatened actions against everybody. There were masses of actions for infringements of patents, and the whole mess was cleared up by the British Government paying huge sums to the patentees, so that they could get along with building aeroplanes for the War 1914-18. And the whole world still uses that idiotic rudder-bar, or rudder pedal control, which is wholly unnatural.

But you will notice that there was no invention about warping wings or using ailerons. All the inventions and patents, and there were dozens of them, had to do with methods of working them, or mechanism to make them work.

I have dealt with these subjects at some length so as to give a clear idea of what is an invention and what is a development. In my next article I will give a few examples of the so-called inventions which are not inventions and some of the things that have been revolutionary developments, or genuine inventions.

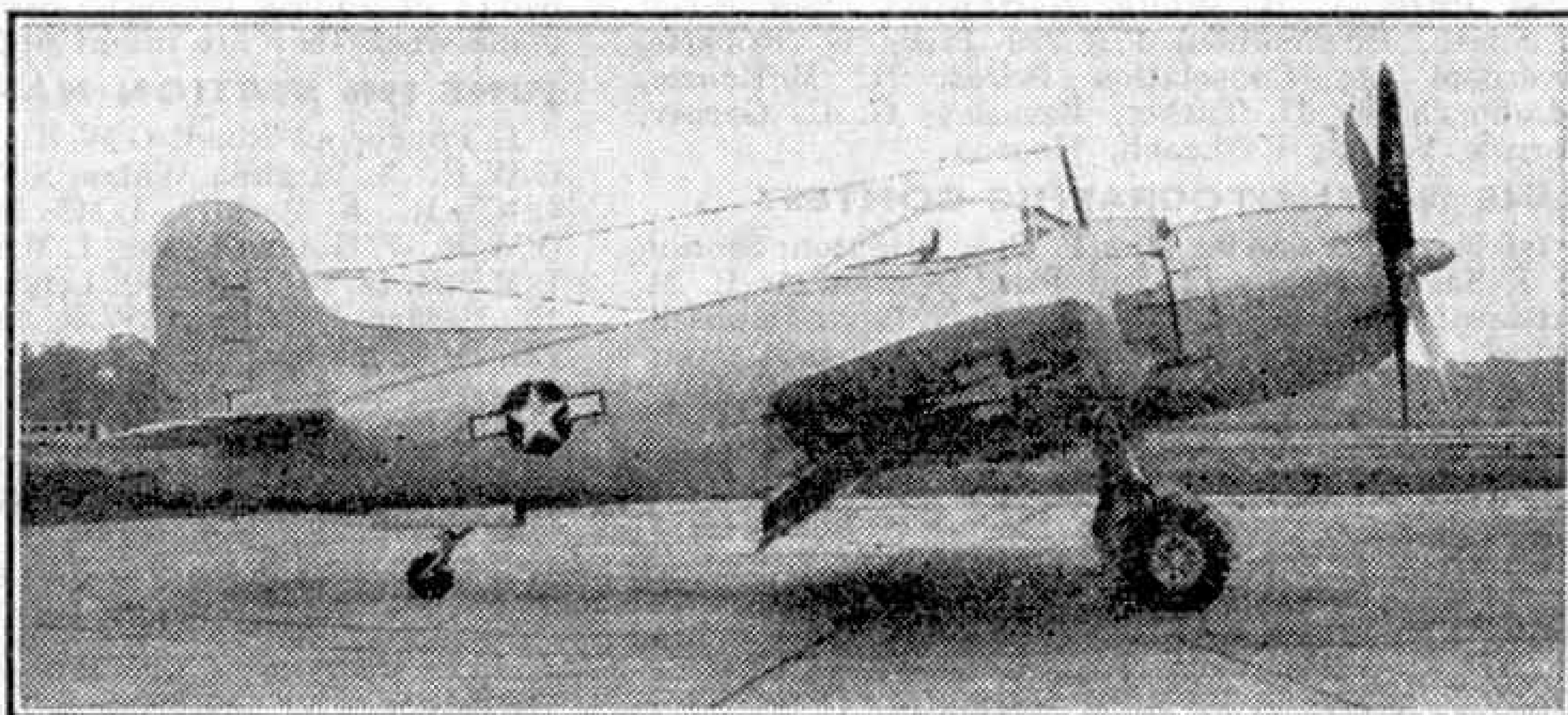
London Underground Railway Extension—*(Continued from page 102)*

and there will be a four minute service from Stratford to such central London stations as Bank, Oxford

Circus, and Marble Arch, and westward to Ealing Broadway at peak hours, and a five minute service at off-peak times. Later the service will be increased to one train every two minutes. The saving of time to travellers from East London is considerable. Liverpool Street can be reached from Stratford in 9 min., and Oxford Circus in 20 min.

Hythe — Home of the Flying Boats—*(Continued from page 119)*

takes some 20 min. and within a further 20 min. the aircraft has been beached at Hythe and the maintenance work begun. This varies, of course, according to the number of hours flying time since the last overhaul, but it may consist of a complete major inspection including the changing of all four



The Martin "Mauler," a type of carrier-based aircraft in service with the U.S. Navy and designed to carry a torpedo, bombs or rockets. It is armed with four 20 mm. cannon. Photograph by courtesy of The Glenn L. Martin Company, U.S.A.

engines. The actual work must be completed in two days, leaving the third free for test flying, final adjustment and the return flight to Poole, where complete refuelling is carried out in readiness for the next journey.

To speed up the work, which can often be done without beaching the flying boats, a new floating dock has just been completed at Hythe. This consists of a double mooring-raft at the end of a jetty 1,100 ft. long and wide enough to take a medium size lorry. The raft is hinged along the middle to increase its flexibility, and each half contains a recess 80 ft. long by 20 ft. wide in which the flying boat can be moored. All the edges of these docks are padded with pneumatic tubing to prevent damage to the boats' thin hulls, and the docks are big enough to accommodate the huge six-engined Saunders Roe 45 flying boats when these are completed. It is the first dock of its kind to be built in this country, and has proved so useful that another is being constructed for use at B.O.A.C.'s passenger base, which is now being moved from its war-time site at Poole to Southampton. Hythe remains the Headquarters of No. 4 Line, however, and will probably continue to do so as long as our flying boats carry the flag of the British Merchant Air Fleet to the four corners of the world.

GUILD AND H.R.C. APPLICATIONS

We regret that the national fuel emergency restrictions have caused serious delay in dealing with the many applications for membership of the Guild and H.R.C. that have been received. When circumstances become normal these will be dealt with as quickly as possible, and those who have sent in applications are asked to be patient.

Fireside Fun

"How much money have you got with you?"
 "Oh between £99 and £100."
 "I say! Isn't that a lot to carry about?"
 "Not really. £1 isn't much, after all."



"How long is a half back before they make him a full back, Dad?"

"Does your watch tell the correct time, my boy?"
 "No, sir. I have to look at it."

"The boss wants a pane of glass 12 in. by 9 in."
 "We haven't got one. All we have are 9 in. by 12 in."
 "All right. I'll take one. If I slip it in sideways he may not notice."

"I sent my little boy for two pounds of apples and you only sent a pound and a half."
 "My scales are all right, madam. Have you weighed your little boy?"

"Give me a sentence with the word 'officiate' in it."
 "A man was ill because of a fish he ate."

"What is meant by a man's assets, Jones."
 "Please, sir, his young donkeys."



"Give me a sweet, Billy!"
 "No, I shan't 'cos you asked."
 "I didn't ask did I, Billy?"
 "No! 'Cos you don't want one."

THIS MONTH'S HOWLER

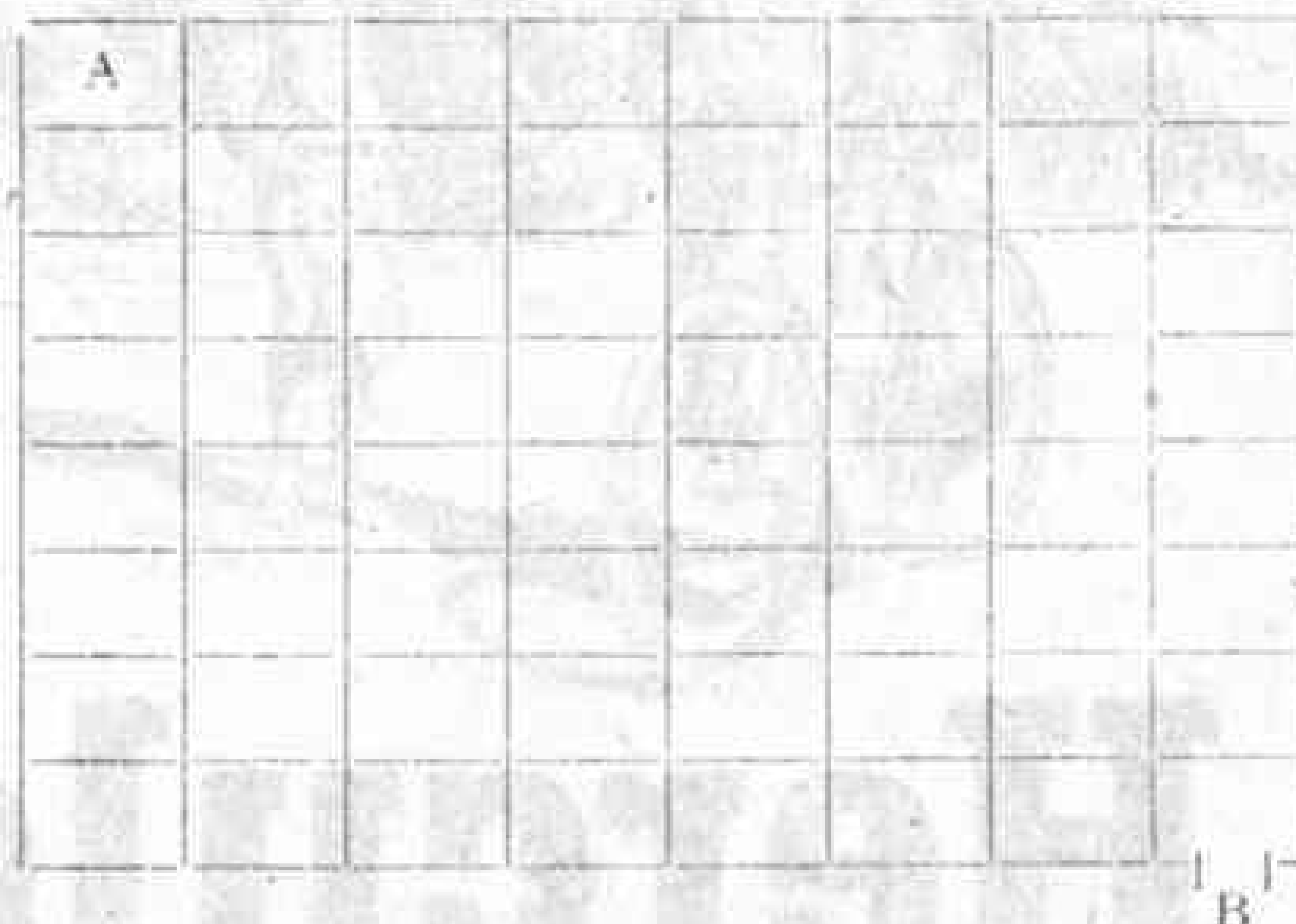
Port Sunlight is on Hudson Bay.

BRAIN TEASERS

THE WAY OUT

The diagram on this page is the plan of a prison in which there are 64 cells. A prisoner in cell A was told that he could have his freedom if he could walk through each cell in turn once only, to pass out finally through the door of cell B. How could he do this?

This is not quite as simple as it sounds, and the wording of the puzzle should be very carefully read. S.W.C.



IS THIS TRUE?

Below is a series of letters that looks incomprehensible. It has been formed by simply leaving out vowels from a sentence that all readers will appreciate. Can you fill in the vowels and separate out the result into words making an intelligible statement?

VRYBYSHLD RDTHMCCNMGZNSTSTHBS
 FTSKNDNTHWRLD B.I.N.

HOW FAR CAN YOU GET HERE?

This is an interesting exercise in word building. Start with the letter A and add successively the letters S, D, H, E, R, I and S, re-arranging the letters in each case to form standard English words. The result should be found tasty.

Now begin with I and add T, E, R, C, D, P, E, and A to give a word of much greater solemnity.

A JUMBLE VARIETY

Here is one of our familiar jumbles, but in order to provide variety I am refraining from saying what the words represent. All are examples of the same kind of thing and the keen-eyed readers of the "M.M." should have no difficulty in deciding what they are.

TSNRHNMRTHP OIOEA; HHRSCIE;
 NWTLRSDMEAO; MHDRAU;
 MHGNRRRLGAIOAES; LCRWLNAO;
 ETSMSROE; RHRSTCRWOIEEE;
 HDGBNEI; and SNRNHCRVREEIOAA.

P.M.H.

SOLUTIONS TO LAST MONTH'S PUZZLES

The solution to the word square of our first puzzle last month is:

K	E	A	T	S
E	M	M	E	T
A	M	U	S	E
T	E	S	T	A
S	T	E	A	K

The key is A MUSKET, the letters in which represent the numbers 1 to 7 inclusive, in order. The catch referred to lies in the fact that the word A is included in the key.

I hope that few readers began elaborate calculations in order to solve the second puzzle last month. The dimensions of the wall were only there to divert attention, for one brick is sufficient to finish a wall of any size whatever!

Bananas on the Brain!



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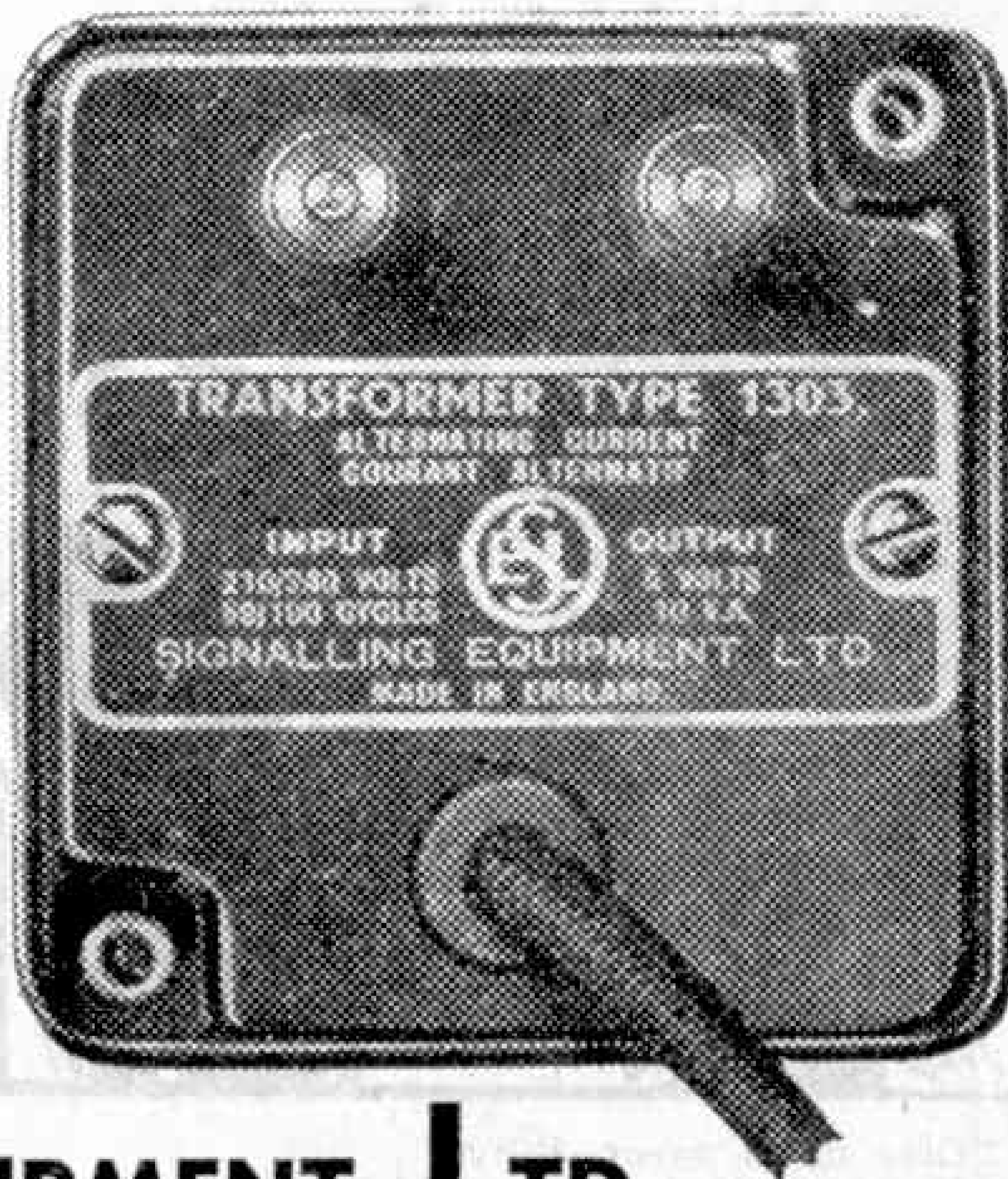
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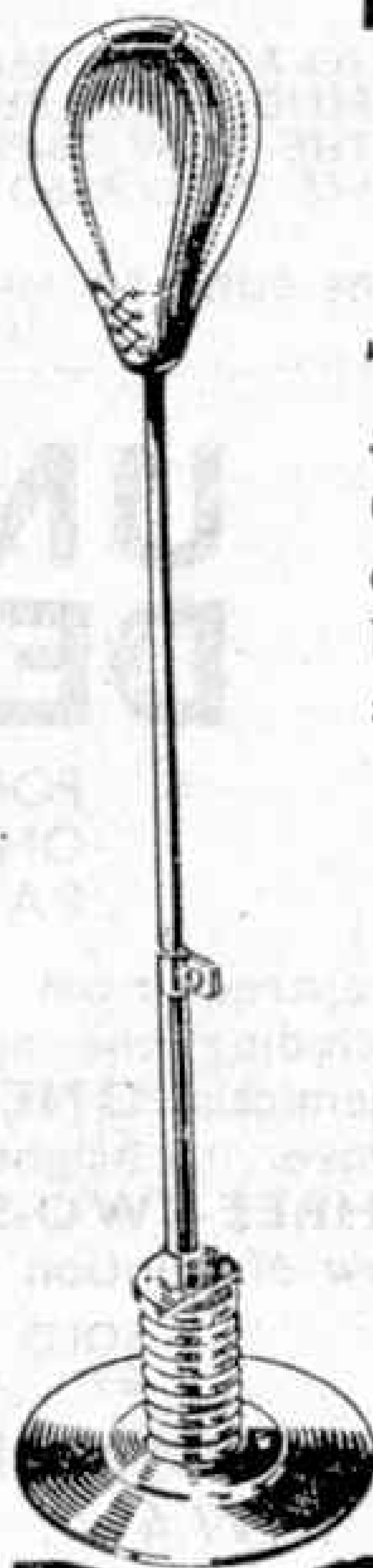
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Cotton Manufacturing
Diesel Engineering
Draughtsmanship
(State which branch)
Drawing Office Practice
Electrical Engineering
Eng. Shop Practice
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Fuel Technology
Heating and Ventilation
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Hydro-Electric
Illumination Engineering

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Steam Engineering
Structural Steelwork
Surveying
(State which branch)
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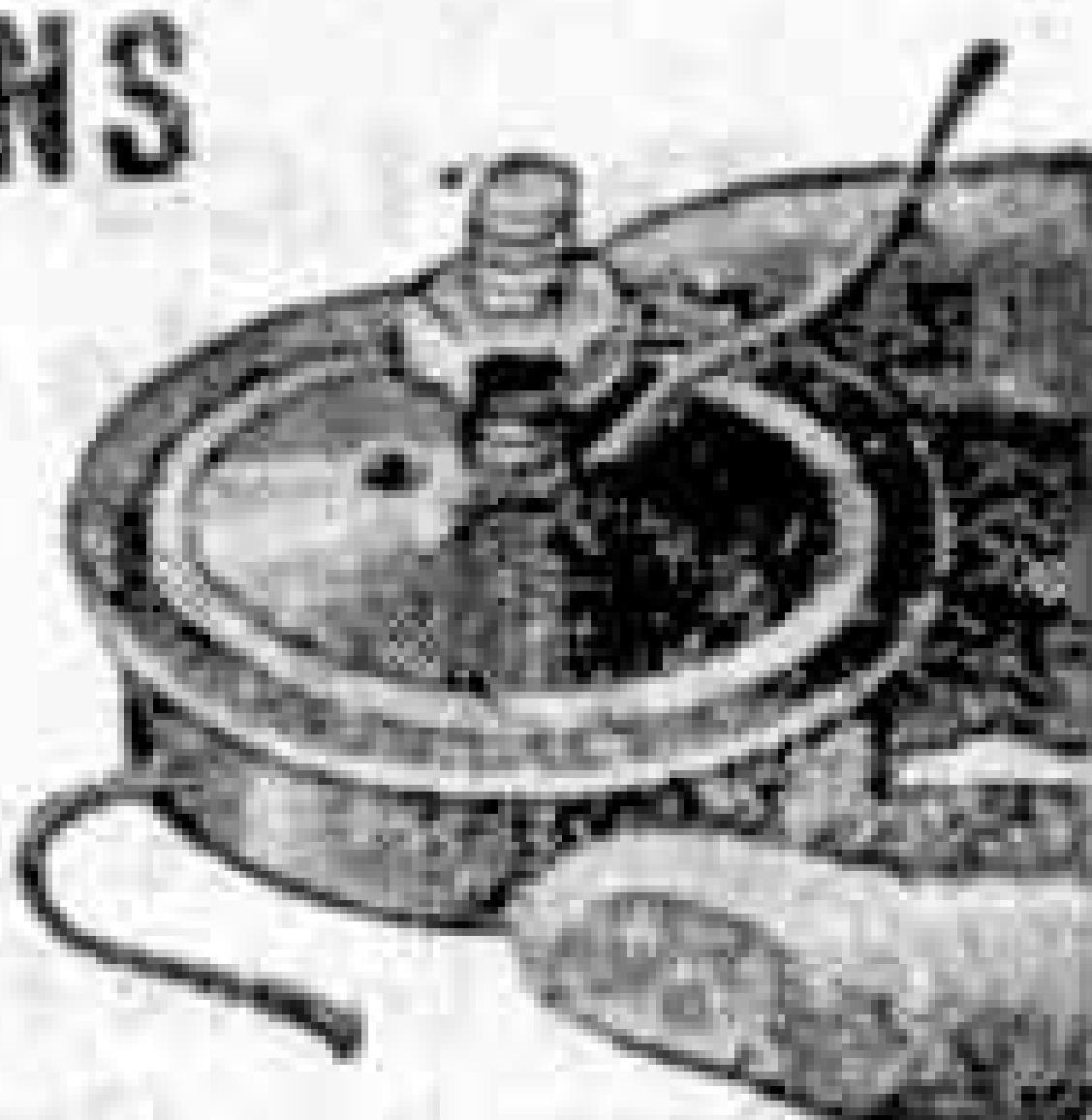


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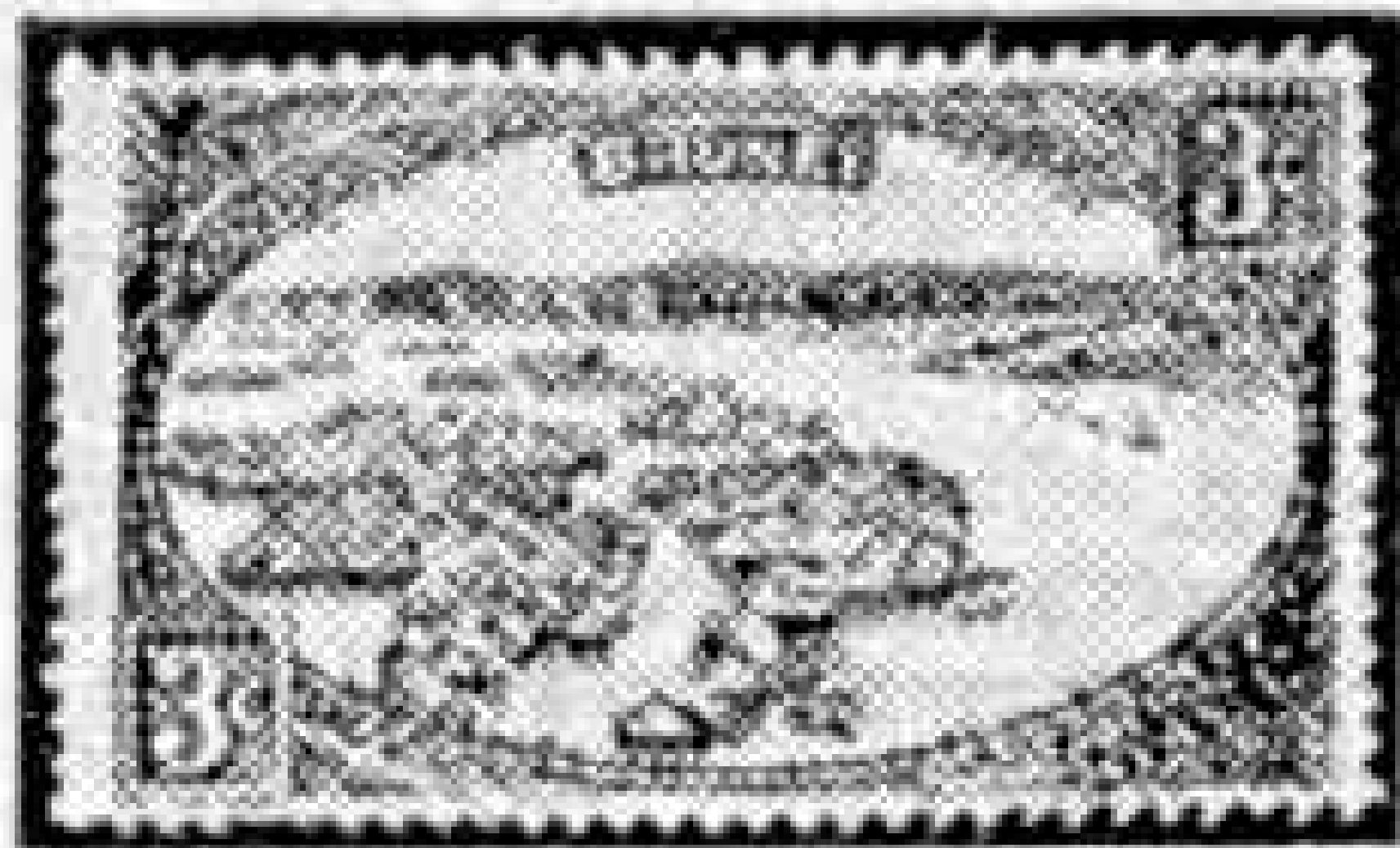
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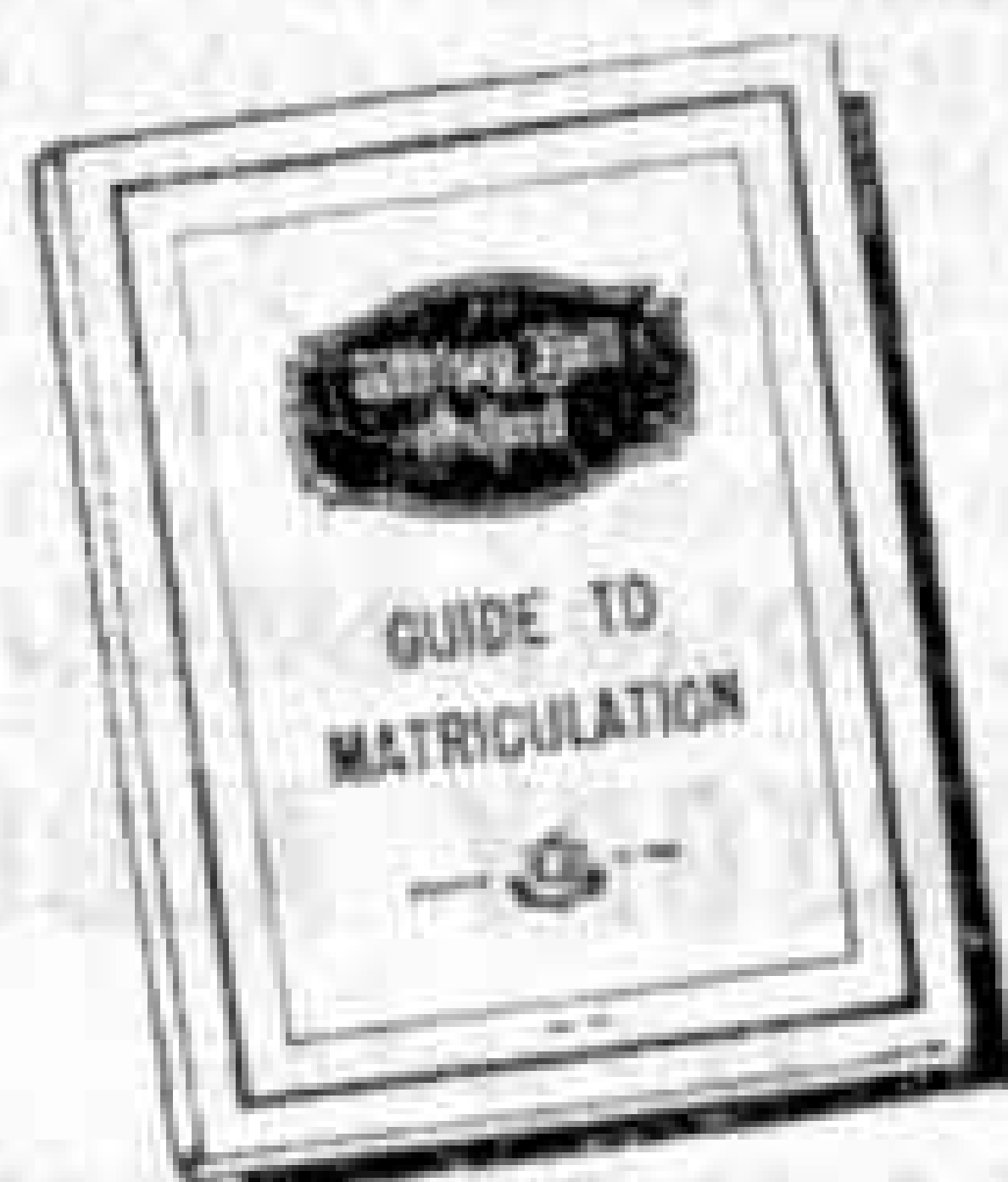
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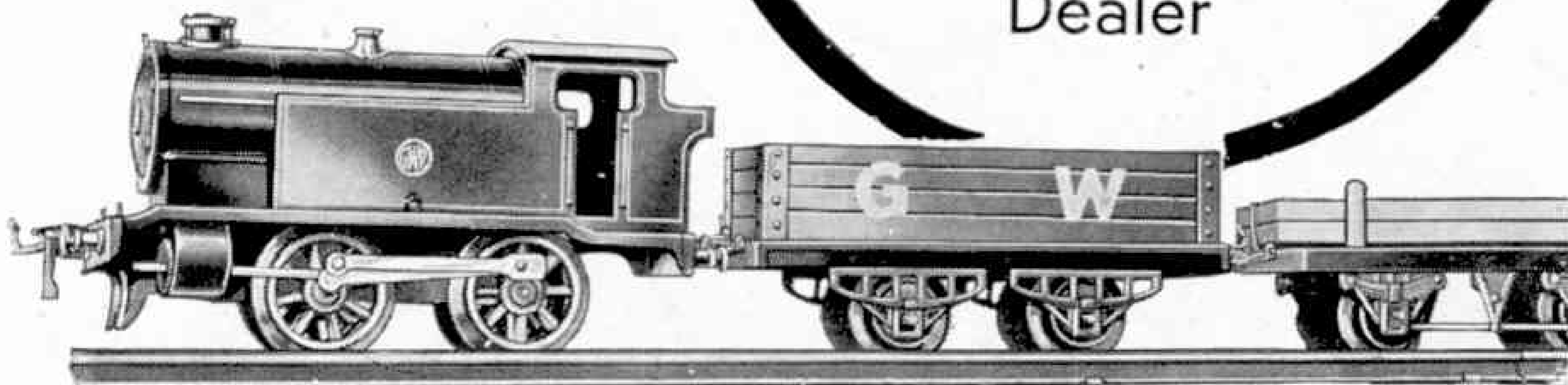
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